

ALASKA RETIREMENT MANAGEMENT BOARD

JUNE 20-21,
2019

BOARD OF TRUSTEES MEETING

ALASKA STATE MUSEUM
LECTURE HALL
395 WHITTIER STREET
JUNEAU, AK
(907) 465-2901

TELECONFERENCE: 1-800-315-6338
ACCESS CODE: 12762#

THURSDAY, JUNE 20, 2019

- I. 9:00 am Call to Order**
- II. Roll Call**
- III. Public Meeting Notice**
- IV. Approval of Agenda**
- V. Public/Member Participation, Communications, and Appearances**
(Three Minute Limit)
- VI. Approval of Minutes – April 4-5, 2019**
- VII. 9:10 Staff Reports**
 - 1. Retirement & Benefits Division Report
 - A. Buck Consulting Invoices (informational)
 - B. Membership Statistics
 - C. DRB Update / Legislation Summary*Ajay Desai, Director, Division of Retirement & Benefits*
Kevin Worley, CFO, Division of Retirement & Benefits
 - 2. Treasury Division Report
Pamela Leary, Director, Treasury Division
 - 3. Calendar/Disclosure
Stephanie Alexander, ARMB Liaison Officer
 - 4. CIO Report
Bob Mitchell, Chief Investment Officer
 - 5. Fund Financial Presentation
Scott Jones, Comptroller
Kevin Worley, CFO, Division of Retirement & Benefits
- VIII. 9:45 Trustee Reports**
 - 6. Chair Report, *Rob Johnson*

7. Committee Reports
 - A. Audit Committee, *Rob Johnson, Chair*
 - B. Actuarial Committee, *Norm West, Chair*
 - C. DC Plan Committee, *Bob Williams, Chair*
 - D. Operations Committee, *Tom Brice, Chair*
 - E. Alaska Retiree Health Plan Advisory Board, *Gayle Harbo, ARMB Member*
8. Legal Report, *Stuart Goering, ARMB Legal Counsel*

- 10:15-10:45** 9. Actuary Reports
2018 Actuarial Valuation
DB and DCR: PERS and TRS Plans
David Kershner and Scott Young, Buck

10:45AM – 10 MINUTE BREAK

- 10:55-11:30** 10. Performance Measurement – 1st Quarter
Paul Erlendson, Callan LLC
Steve Center, Callan LLC

- 11:30-12:00** 11. Fiduciary/Legal Education
Stuart Goering, ARMB Legal Counsel

LUNCH – 12:00PM - 1:15PM

- 1:15 – 1:45** 12. Asset Allocation Review and Approval
Bob Mitchell, Chief Investment Officer

- 1:45 – 3:15** 13. PERS/TRS Asset Liability Study
FY20 Asset Allocation
Jay Kloepper, Callan LLC

Action: Adopt Asset Allocation

Resolution 2018-03:

DB PERS/TRS/JRS

PERS/TRS/JRS Retiree Health Trusts

Retiree Major Medical HRAP/ODD

Resolution 2018-04: DB NGNMRS

FRIDAY, JUNE 21, 2019

- 9:00-9:50** 14. Manager Structure
Bob Mitchell, Chief Investment Officer
- 9:50-10:35** 15. China Strategy Manager
Amanda Montgomery, Allianz Global Investors

10:35AM – 10 MINUTE BREAK

- 10:45-11:30** 16. China Strategy Manager
Allan Duckett, Schroders

- 11:30-12:00** 17. IAC Presentation
Dr. William Jennings, Investment Advisory Council Member

LUNCH – NOON - 1:15PM

- 1:15** 18. Investment Actions
Bob Mitchell, Chief Investment Officer

- IX. Unfinished Business**
- X. New Business**
- XI. Other Matters to Properly Come Before the Board**
- XII. Public/Member Comments**
- XIII. Investment Advisory Council Comments**
- XIV. Trustee Comments**
- XV. Future Agenda Items**
- XVI. Adjournment**

NOTE: Times are approximate and every attempt will be made to stay on schedule; however, adjustments may be made.

**State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
MEETING**

Location
Alaska State Museum
Lecture Hall
395 Whittier Street
Juneau, Alaska

**MINUTES OF
April 4 - 5, 2019**

Thursday, April 4, 2019

CALL TO ORDER

CHAIR ROBERT JOHNSON called the meeting of the Alaska Retirement Management Board (ARMB) to order at 9:00 a.m.

ROLL CALL

Eight ARMB trustees were present at roll call to form a quorum.

Board Members Present

Robert Johnson, *Chair*
Tom Brice, *Vice-Chair*
Gayle Harbo, *Secretary*
Lorne Bretz
Allen Hippler
Commissioner Bruce Tangeman
Commissioner Kelly Tshibaka (arrived late)
Norman West
Bob Williams

Board Members Absent

None

Investment Advisory Council Members Present

Dr. William Jennings
Robert Shaw

Department of Revenue Staff Present

Bob Mitchell, Chief Investment Officer
Scott Jones, State Comptroller
Pamela Leary, Director, Treasury Division
Zachary Hanna, Chief Investment Officer
Shane Carson, State Investment Officer
Stephanie Alexander, Board Liaison
Mark Moon
Steve Sikes
Michelle Prebula
Bronze Ickes
Jesse Blackwell
Casey Colton
Victor Djajalie
Kevin Elliott
Emily Howard
Kayla Wisner
Tina Martin
Sean Howard
Tim Shockley
Nick Orr
Stephanie Pham
Kekama Tuiofu
Coltin Lanz
Greg Samorajski

Department of Administration Staff Present

Kevin Worley, Chief Financial Officer, DRB
Ajay Desai, Director, DRB
Mark Breunig, Chief Technology Officer, OIT
Kathy Lea
Christina Maiquis
Emily Ricci
Shane Francis
Betsy Wood
Andrea Mueca
Teresa Kesey
Melanie Helmick
Roberto Aceveda
Dawn Bonnett
Michelle Holland-Zenger
Joshua Hartman

ARMB Legal Counsel

Stuart Goering, Department of Law, Assistant Attorney General

Consultants, Invited Participants, and Others Present

Paul Erlendson, Callan Associates, Inc.

Steve Center, Callan Associates, Inc.

Jay Kloepfer, Callan Associates, Inc.

Nils Andreassen, Alaska Municipal League

Greg Behar, Legal and General Investment Management

Sara Shores, BlackRock

Laura Champion, BlackRock

Gaurav Mallik, State Street Global Advisors

Robert Shapiro, State Street Global Advisors

Gregor Andrade, AQR Capital Management LLC

Zachary Mees, AQR Capital Management LLC

Daniel Morgan, State Street Global Markets

Michael Putica, State Street Global Markets

PUBLIC MEETING NOTICE

Board Liaison STEPHANIE ALEXANDER confirmed that public meeting notice requirements had been met.

APPROVAL OF AGENDA

MRS. HARBO moved to approve the agenda. MR. BRICE seconded the motion.

CIO BOB MITCHELL moved to remove the executive session under Item No. 21, to be taken up at a future meeting. MR. BRICE seconded the motion. CHAIR JOHNSON suggested taking up the election of the Chair of the Actuarial Committee under New Business. With those changes, the agenda was adopted.

PUBLIC/MEMBER PARTICIPATION, COMMUNICATIONS AND APPEARANCES

NILS ANDREASSEN, Executive Director of the Alaska Municipal League, which represents 165 cities and borough governments including 64 who are employers within PERS, addressed the Board. MR. ANDREASSEN noted that the AML had recently expressed concern with the appointment of Mr. Lorne Bretz in place of Kris Erchinger on the ARM Board, asserting that Mr. Bretz does not meet the statutory requirements for the position. MR. ANDREASSEN explained that statutes require that this seat be filled by a finance officer of a participating political subdivision. The Alaska Municipal League objects to Boards and Commissions defining someone whose job is purchasing and property appraisal as a “finance officer”, which traditionally means someone with responsibility for the budget of a municipality or political subdivision. MR ANDREASSEN went on to say that the ARM Board is lacking in representation by employers in the retirement system, beyond the largest; and the League is concerned that instead of a cost-sharing plan, what has developed is a cost-shifting plan. He stated

that they believe it is more important than ever that this board represent employers and beneficiaries and others who can not only make the best decisions in the interest of the system, but who are fully aware of the consequences of those decisions.

APPROVAL OF MINUTES: December 11 - 12, 2018 and January 11, 2019

MR. BRICE moved to approve the minutes of the December 11 - 12, 2018, and the January 11, 2019 meetings of the ARM Board. MRS. HARBO seconded the motion.

With no objections, the minutes were approved.

ELECTION OF VICE CHAIR

CHAIR JOHNSON noted that the previous Vice Chair of the ARM Board had not been reappointed, so the board needed to elect a new Vice Chair. MRS. HARBO nominated TOM BRICE. MR. WEST seconded the motion. MR. BRICE confirmed that he would be interested in the position. CHAIR JOHNSON verified that there were no objections, then congratulated MR. BRICE on his election.

CHAIR JOHNSON welcomed two new members, MR. BRETZ and MR. HIPPLER, to the ARM Board. He also welcomed COMMISSIONER TSHIBAKA, who was not present at that time, and thanked all for their service.

STAFF REPORTS

1. RETIREMENT & BENEFITS DIVISION REPORT

A. Staff Introductions

MR. DESAI, Division Director for Retirement and Benefits, introduced EMILY RICCI, the chief account policy administrator. MS. RICCI introduced other team members in the DRB, including Shane Francis, healthcare economist; Betsy Wood, deputy health official; and Andrea Mueca, operations manager. VICE CHAIR BRICE noted the absence of Ms. Michaud, who passed away recently, and recognized the Board's appreciation for the work that she did.

MR. DESAI added that these are the people who have been working hard for two and a half years on the EGWP implementation.

MR. WORLEY asked the finance and accounting representatives to introduce themselves. Present were Christina Maiquis, responsible for financial reporting; Melanie Helmick, the state Social Security administrator and the employer auditor for the DRB; Teresa Kesey, who works in the finance section and oversees active payroll; Kathy Lea, chief pension officer; and Roberto Aceveda, counseling and education manager.

B. Membership Statistics

MR. WORLEY reported on retirement system membership through the quarter ending December 31 in the meeting packet. He noted that at the Board's request, they provided the membership accounts for the defined benefit plan and the defined contribution plan for comparison on a quarterly basis. MRS. HARBO commented that the Defined Contribution plan showed 863 full disbursements for PERS and 170 for TRS, almost as many as the number of full retirements, which is a lot of turnover.

C. Buck Invoices

MR. WORLEY noted that Conduent had changed its name back to Buck, and the summary of monthly billings was shown with quarterly results and a comparison to the prior year. MRS. HARBO asked whether the GASB reporting charges were done yet; MR. WORLEY answered that the reports were done the past quarter, but were currently being audited by KPMG, which might incur some minor charges. He also noted that Buck's contract is extended for one year, expiring June 30, 2020.

MR. WORLEY concluded by expressing his appreciation for the work that the DRB staff does.

2. TREASURY DIVISION REPORT

DIRECTOR PAM LEARY said she didn't have much that wouldn't be part of the committee reports, but she wanted to share appreciation of their staff. She recognized the new deputy commissioner, Greg Samorajski; and two employees who just celebrated 25 years with the State, opportunistic strategies manager Steve Sikes, and Michelle Prebula, who was the cash manager and now is an investment officer in the external public equity and DC plans. Also present were cash manager Bronze Ickes and assistant cash manager Jesse Blackwell, investment officer Casey Colton, head of fixed income Victor Djajalie; Kevin Elliott, part of the internal public equity team; Emily Howard, who is an investment officer in the fixed income group; Sean Howard, in the private equity and absolute return group; Scott Jones; and Kayla Wisner, assistant comptroller.

MS. LEARY thanked all of the staff for everything they do to make the Division run as well as it does. CHAIR JOHNSON commented that a silver lining in having more board meetings in Juneau is the opportunity to see all the staff from the Department of Revenue and the Division of Retirement and Benefits, and expressed the Board's appreciation as well.

3. CALENDAR/DISCLOSURES

MS. ALEXANDER directed board members to the disclosure document and calendar in the meeting packet; she noted that the calendar is a work in progress, and asked if anything should be added. CHAIR JOHNSON explained that an Actuarial Committee meeting is listed on May 2 and 3, and since the Actuarial Committee is largely a committee of the whole, MR. WEST had suggested compressing it into the Board of Trustees meeting. There were no objections, so MS. ALEXANDER will revise that schedule. Also, it was noted that the June ARM Board meeting is now scheduled to be held in Juneau.

4. CHIEF INVESTMENT OFFICER REPORT

Chief Investment Officer BOB MITCHELL explained that part of his regular report is a “Summary of Portfolio Moves”, which was handed out at the meeting with an update included. He said that the purpose is to convey to the Board actions that he has taken under the authority that has been delegated to him to make investment related transactions other actions. MR. MITCHELL reviewed his report, giving brief explanations and inviting questions; he noted that the plans experienced net outflows of a little over \$400 million, at a rate of a little over \$90 million a month most months, except the month in which the state assistance payment is received, usually as a lump sum early in the fiscal year. That is almost a billion dollar outflow from the plans over a year, and it necessitates liquidating securities to fund, which is reflected in many of the transactions in the report.

MR. MITCHELL discussed the watch list, which currently has five managers on it, based on qualitative and quantitative criteria which would be considered for revisions later in the meeting.

MR. MITCHELL stated that a communication from a participant had requested that they consider adding bank certificates of deposit to the investment lineup for the DC and participant-directed options and creating an open brokerage window. He responded to the participant that he would raise those concerns to the Board, but would express his view that when considering new options, plan managers are mindful of the impact on the range of potential investment options available, and he doesn’t think CDs have yields materially different from certain funds currently offered. MR. MITCHELL said that it is staff’s view, and he believes Callan’s as well, that when brokerage windows are offered they tend to have a low take-up, and more options may be a source of confusion to participants. MR. WEST asked if they had done any surveys on the issue, and KATHY LEA responded that they had, and only got about 20 percent in responses, and of those about 2 percent were in favor of a brokerage window. She added that about 80 percent of participants stay in whatever fund they were originally placed in. The 20 percent who do something else do it through the managed account feature, or on their own. VICE CHAIR BRICE suggested that the Defined Contribution Committee could review on a regular basis the efficacy of possibly offering additional options.

MR. MITCHELL also discussed the securities lending program which was reinitiated in February of 2017. The ARMB lends securities for which participants are willing to pay a premium to borrow, then the cash collateral that is received is invested in Treasury money market instruments. He said that they lend out 20 percent of their securities and get 80 percent of the revenue that they would otherwise get with a lot less operational complexity. State Street, the agent in this program, contacted them and asked them to waive sovereign immunity for a portion of the securities that are being lent. The waiving of sovereign immunity is standard boilerplate language in most agreements with international lenders and borrowers of securities, and they have lent to some of these borrowers since the inception of the program. However, the ARM Board’s contract says that they aren’t allowed to do that, and after discussion with Mr. Goering, they have instructed State Street to stop lending in those cases. After a couple of weeks, they got all of their securities back and suspended that activity, which should have an impact of about \$350,000 per year.

MR. MITCHELL pointed out a chart on the third page of his report which he described as an attempt to assist the Board by creating a framework of the decision-making of the Board, showing the

hierarchy of decisions in the areas of strategic allocation decisions, implementation by managers, and monitoring of the results.

5. FUND FINANCIAL PRESENTATION AND CASH FLOW UPDATE

State Comptroller SCOTT JONES noted that the February Board report is in the packet, and he would focus on the activity that has occurred in March and the first three days of April. At the end of March, the nonparticipant-directed plans had \$280 worth of income and experienced a \$102 million net outflow. The total for the plans was \$26.2 billion, and in the first three days of April, the plans had \$219 worth of income and net contributions of about \$4 million. Roughly \$9 billion is under internal management.

CFO KEVIN WORLEY explained the figures in his report on fund contributions and withdrawals for the benefit of new Board members. He noted that pages 4 and 5 show, at the request of Trustee Harbo, what financial activity occurs. MRS. HARBO asked a few questions, and commented that it looks like so far this year people leaving the system and taking their money out completely amounts to about \$48 million, or about \$6 million a month. MR. WORLEY added that another \$145 million is leaving through SBS.

6. CHAIR REPORT

CHAIR JOHNSON commented that the new trustees and commissioner have been welcomed, and the rest of the Board looks forward to working with them. He reported that he had sent letters to MS. ERCHINGER and MRS. SCHUBERT thanking them for their service; copies were included in the meeting materials, and he read the letters for the record.

CHAIR JOHNSON reported that he had participated in testimony before a Senate committee a couple of days prior to this meeting about ARM Board issues and unfunded liability. He said that he had taken part in numerous discussions regarding the state budget issues, and consistently urged appropriate increases in budgets for the ARM Board as well as staff to the amounts necessary to fulfill the legislative duties of collective decision-making and the best practice and administration of the retirement systems for the beneficiaries.

7. COMMITTEE REPORTS

A. Audit Committee

CHAIR JOHNSON reported that the Audit Committee had a meeting the day before the full Board meeting. They heard presentations from MR. WORLEY and MS. HELMICK of the DRB about the actual costs and their impact on the ability to audit, again in the same vein of urging appropriate funding for good auditing. MR. McKNIGHT, senior compliance officer with the Department of Revenue, gave a compliance report and update and reported that the FY19 Audit RFP is going through the normal procedures. CHAIR JOHNSON mentioned that there was significant discussion about internal auditing, which is a function provided by staff, and the presentation from DRB was helpful in concluding that those staff are following best practices as laid down by an association of public

pension fund auditors. CHAIR JOHNSON added that the proxy policy was discussed, and he suggested that the Board should review that policy.

B. Operations Committee

VICE CHAIR BRICE reported that yesterday he was made chair of the Operations Committee, which is a combination of the old salary committee and the old budget committee. COMMISSIONERS TSHIBAKA and TANGEMAN spoke at the Operations Committee meeting about pending legislation regarding exempt and partially exempt employees and their salaries that may affect some Treasury Department staff. VICE CHAIR BRICE said there was vigorous conversation about the ARM Board budget and plans for upcoming meetings; more meetings will be held in Juneau and by videoconference to save money. They also discussed the Board's educational efforts, which is a statutory requirement, and the travel budget.

VICE CHAIR BRICE also stated that Callan had given CIO Mitchell some recommendations on the ARM Board's guidelines and Investment Policies and Procedures Manual, which Mr. Mitchell will prepare to address in proposals to the committee and the Board over the next couple of meetings.

VICE CHAIR BRICE moved to adopt the charter for the Operations Committee as written. With no objections, the charter was adopted.

C. DC Plan Committee

BOB WILLIAMS, chairman of the DC Plan Committee, reported that their meeting the day before was lively, with two people calling in to give public testimony. One requested an update on the Monte Carlo analysis, and MR. WILLIAMS said they plan to have that for the June meeting. The other participant had questions about SBS, which KATHY LEA said they would respond to by next week.

MR. WILLIAMS reported that KATHY LEA and ROBERTO and LIZ DAVIDSON gave a legislative update and an Empower update, and SHANE CARSON and SEAN LEWIS from BlackRock presented to them about combining the existing TIPS and REIT options into a single multi-asset fund, which will come up as an action item recommended by the Operations Committee later in the meeting.

D. Retiree Health Plan Advisory Board

MRS. HARBO is the ARM Board representative on the Retiree Health Plan Advisory Board, and she reported that what they call the Rehab Board just celebrated its first year in February, when some of the members attended the quarterly meeting with Aetna, and they teleconferenced with staff in Juneau. MRS. HARBO said that the Division had been working on the rollout of OptumRx, a new pharmacy provider, and they had a successful rollout on January 1, 2019. EGWP, a wraparound to provide drugs through Medicare Part B, has been very successful. MRS. HARBO said that the reimbursement program will affect employee contribution rates starting in FY21.

MRS. HARBO said that most of the Rehab Board meeting the next day was spent on discussing a

modernization plan, with about 20 items that the Division wanted changed or increased, each of which must have a cost analysis by their actuary from Segal. MRS. HARBO also mentioned that the Division has been very successful with its Tele-Town Hall. The most recent one was held on March 21, and each time 500 to 1,000 retirees participate with lots of questions.

E. General Consultant Evaluation Committee

MR. MITCHELL stated that the contract for the ARM Board's general consultant and a real estate consultant expired on June 30th. The RFPs were issued for both, and the scope of the real estate consultant was expanded from just real estate to include all of the real assets within that asset class. The General Consultant Evaluation Committee, which met on March 6, was comprised of TOM BRICE, GAYLE HARBO, KATHY LEA, and BOB MITCHELL.

F. Real Assets Consultant Evaluation Committee

The Real Assets Evaluation Committee, which met on March 5, was comprised of BOB WILLIAMS, ZACH HANNA, and BOB MITCHELL. MR. MITCHELL reported that they met and scored the RFP respondents in all elements except the cost, which was kept separate, retained by Board Liaison Stephanie Alexander. The scores were compiled by Ms. Alexander and tabulated including costs, and later in the meeting the Board will take up the issue of selecting the new consultants.

8. LEGAL REPORT

Assistant Attorney General STUART GOERING discussed two matters in litigation that may affect the liabilities of the pension funds, the Metcalfe case and the retiree dental benefits case. The first is on appeal, pending oral argument in the Supreme Court, and the second is pending in Superior Court and should be decided soon.

9. PERFORMANCE MEASUREMENT – 4TH QUARTER

PAUL ERLENDSON stated that Callan's general responsibility to the Board is for performance reporting, to provide support and assistance to the staff as needed, and to help facilitate education so that the Board can fulfill their fiduciary duties. MR. ERLENDSON said that he and STEVE CENTER would go over the performance report as of December 31, give an introduction to some capital market issues, and after they speak, JAY KLOEPFER, head of Callan's capital markets research group, would present some preliminary observations about an asset allocation study.

MR. ERLENDSON discussed the conditions in the US economy, and said that over the last 10 years, the average public pension funds' return has been less than 6 percent, and the dilemma is whether to take more risk to get higher returns, or to settle for lower returns and higher contribution requirements. He discussed the difference between growth and value, and the choice of whether to use an index fund or to hire active managers. He explained interest rates on bonds and the beginning of an inverted yield curve, which suggests that a recession may be approaching, which is likely in an economy that has been growing for most of a decade.

MR. CENTER discussed the performance of the pension and defined contribution plans. He explained that in the presentation the PERS portfolio is used as representative of the overall pension system, since PERS and TRS are similar in asset allocations, and the other two plans are built the same way. MR. CENTER showed the asset allocation as of year end and compared it to the target asset allocation, cautioning that the information is no longer current. Then he compared how asset allocation of the PERS portfolio differs from other public funds, with a higher allocation to real assets and alternatives than many of its peers, and a substantially lower allocation to fixed income and slightly lower to domestic equity. These differences were positive for the plan relative to other pension plans, though performance was negative in the fourth quarter of 2018. He went over the Sharpe ratio, a measure of risk-adjusted performance, and standard deviation, which is an overall measure of volatility, in both of which measures the PERS plan is doing well compared to other public pension funds. MR. CENTER explained attribution tables which show the performance drivers of the plan relative to its benchmark, focusing on the columns on Manager Effect and Asset Allocation. He said that the overall driver of performance relative to the index over the past quarter and the past year has been the manager effect, particularly in the alternatives portfolio, and he discussed the performance of various asset classes.

The discussion of the DC plans was postponed until the next day.

CHAIR JOHNSON recessed the meeting from 10:51 a.m. to 11:04 a.m.

10. PERS/TRS ASSET LIABILITY STUDY

MR. MITCHELL explained that in September of 2018, the ARM Board had engaged Callan to conduct an asset liability study, which had last been done about ten years ago. The purpose of the study is to evaluate the asset allocation decisions with the benefit of evaluating the interaction of assets and liabilities. JAY KLOEPFER, executive vice-president and director of capital markets research and alternative research at Callan, presented the initial insights. MR. KLOEPFER explained that the point of the study is to help set investment policy, which is the cornerstone of what the Board does, and the most important decision is how much to risk in assets.

MR. KLOEPFER emphasized that there is no one right answer; each pension plan is unique. The goals are very long term and some may be more concerned with minimizing costs, while others may be concerned about funded status volatility. He noted that every year they do an in-depth dive into the asset allocation, but this study is a chance to do it in an even bigger picture with the liabilities involved. The plan was closed just prior to the last study, and now has been closed for ten years. A lot has changed since then. Ultimately the Board wants to confirm that the policy is meeting their return and risk requirements.

MR. KLOEPFER noted that it is reasonable to do a study like this every five years. COMMISSIONER TSHIBAKA asked why it has been ten years, if every three to five years is best business practice. MR. MITCHELL replied that the idea that it is best practice has only recently been socialized, but they have now inserted language into their general consultant contract providing these studies as part of the services.

MR. KLOEPFER explained that the Board only has control over the investment policy. The sponsoring body sets the funding policy, and the benefit policies are typically set elsewhere as well, and the Board has to consider those. He went over how the asset liability study is carried out and how the results are presented to view it as a risk-and-reward tradeoff. MR. ERLENDSON mentioned that this presentation should help the Board start prioritizing their objectives to use as a lens through which to evaluate the various asset mix alternatives and decide which best fits their sense of risk management.

MR. KLOEPFER said that they would be doing a Monte Carlo simulation, a technique for evaluating ranges of potential outcomes and then coming up with distributions of those outcomes. He showed an example, not based on the ARMB portfolio because they are still getting data from Buck to put through this model; he said that they should deliver the results in the next couple of months. He went over things the Board will be considering, including liabilities, net cash flow, liquidity, duration, and risks like inflation, longevity, and limited interest rates.

MR. KLOEPFER said that the capital markets pose the biggest risk of volatility for the plan, so they do 10-year forecasts of capital market expectations, and he explained how they do the calculations. He noted that some of the alternative strategies like real estate, private equity, and others are harder to model because they are not publicly traded, so it takes a lot of informed judgment to make decisions about these, which are also sources of illiquidity. He discussed grouping asset classes by risk stance: equity and real assets are risk-seeking, while fixed income would fall under risk mitigation. MR. KLOEPFER said that when the study is presented to trustees, they will discuss whether it is necessary to pursue the 7.13 percent return over a 10-year time horizon, and figure out the broad risk posture of the fund, then talk about implementation. They will be acknowledging liquidity requirements, and talking about what would happen if they had a longer time horizon. Callan comes up with 10-year sets of expectations and a long-term equilibrium number, and they will consider different scenarios and different mixes of assets. This overview was to prepare the Board for the discussion of strategic asset allocation at the June meeting.

CHAIR JOHNSON recessed the meeting from 12:15 p.m. to 1:30 p.m.

11. WHAT IS FACTOR-BASED INVESTING?

MR. MITCHELL said that a couple of years ago, the ARM Board had adopted a strategy called factor-based investing, which is now internally managed. He said that they are now in the process of contracting with Legal and General to deploy a similar strategy for emerging markets, and staff is considering the feasibility of investing in that internally as well. MR. MITCHELL said that factor-based investing is an important concept, and given the recent turnover on the Board, he thought it should be brought back as an education item, which is why Legal and General are here.

GREG BEHAR, head of index strategy for Legal and General Investment Management, said that one of the things they do is passive indexing, and managing factors is a part of that. He explained active and passive investing, and the development of indexes and of using indexes to gauge the success of active managers. Legal and General does indexing with \$450 billion in assets owning all 500 securities of the S&P 500 to replicate the risk and return characteristics. They are trying to create

smarter indexes that capture some of the same things that active managers are looking for such as value, high momentum, or low volatility. Factor-based investing is capturing those characteristics in a low-cost, transparent, and rules-based index.

Factors, by academic consensus, are value, low volatility, small size, and momentum, each of which has a risk-based, behavioral rationale for its existence. MR. BEHAR briefly explained each one, and said that having a balance of 25 percent in each factor is ideal to achieve higher returns with less risk and lower management fees.

12. BLENDING ALPHA-SEEKING, FACTOR AND INDEXING STRATEGIES

MR. MITCHELL commented that the bar has risen over time for what is considered active investing, and avoiding paying active fees for something that can be done at a lower cost is appealing.

LAURA CHAMPION, ARM Board's client service contact from BlackRock, and SARA SHORES, global head of investment strategy for BlackRock's factor-based strategies group, presented to the Board on how active, passive, and factor-based investing can be combined.

MS. CHAMPION explained that BlackRock's factor-based strategies team is led by Andrew Ang, who has been with the firm for over four years, and they oversee just over \$200 billion in assets including smart beta strategies, enhanced strategies which encompass risk parity strategies, and absolute return-seeking strategies.

MS. SHORES said that their philosophy is similar to that of the previous speaker. She went on to describe how thinking about returns in portfolios has evolved over the last few decades due to advancements in data and technology, so that now it is understood that a lot of above-benchmark return comes not from the insight of managers, but as a result of these broad, persistent drivers of return called factors. She defined "broad" as spanning asset classes: not just U.S. stocks but global; not just stocks but bonds, currencies, commodities, even private asset classes. She defined "persistent" as enduring over decades, even after being well understood.

MS. SHORES described two different kinds of factors: macroeconomic factors, including the pace of economic growth, the level of interest rates, and the rate of inflation, are the three most important drivers that impact every asset class, both public and private; and within asset classes, style factors including value, momentum, quality, low volatility, and carry. She said they have actually identified about 200 factors.

MS. SHORES listed BlackRock's four criteria that an investment idea must meet to qualify as a rewarded factor, persistently rewarded over time. The first and most important is economic rationale. They believe that every rewarded factor is a result of a rewarded risk, a structural impediment, or a behavioral bias, which is why it earns positive returns even if everyone knows about it. If they don't understand why, they don't invest.

Second, they want to see evidence of value creation through a positive return. MS. SHORES noted that growth is not on the list. She explained that growth is the opposite of value, and if there is a positive expected return for value by definition, there must be a negative expected return for growth.

Also, the different factors are rewarded at different points in an economic cycle. Diversification, or low correlation with other factors, is another criterion. They want ideas that are distinct from each other and from the core risks that are in the portfolio. The final criterion is that the idea must be something that can actually be implemented at scale. It is important to understand the potential cost and market impact of trading.

MS. SHORES said that BlackRock has designed a tool called Aladdin Factor Workbench, which essentially X-rays a portfolio through the factor lens previously described to help investors see what they own and think about what they want to own. She said that often the first step is an index-based form in equities, similar to what Mr. Behar described. But a lot more can be done if some constraints are released, such as investing in factors across fixed income, currencies, and commodities. These enhanced strategies are more dynamic and often more diversifying. Some investors transcend asset classes altogether and think in terms of factors. MS. SHORES named a few international funds that now write their investment policy statements in factor language.

MS. SHORES said that in bringing index factors and alpha together as an element of portfolio design, it is important to pursue above-benchmark returns, while recognizing that not all of that is alpha; to pursue value for money; and to make informed and deliberate decisions. BlackRock believes that they can deliver a better portfolio, can more effectively and consistently meet objectives, and ultimately lower costs by thinking of index, factors, and alpha as three complementary sources of return. This moves past the active/passive debate and seeks to deliver something above and beyond the benchmark return by accessing those broad and persistent drivers, value, quality, and momentum, at a modestly higher fee than for an index strategy. While considering fees, transparency, and risk, investors put together a mix to try to get the outcome they are aiming for. MS. SHORES said that the right mix for each investor is a function of the returns they want, the risk they are willing to take, and the fees that they are willing to pay.

MS. SHORES showed some examples and comparisons of optimal mixes at different levels of risk. Investors also have to consider their investment philosophy and practical issues like their governance, oversight, and constraints. Graphs of the efficient frontier showed that adding factor strategy to the opportunity set, as well as some low risk, systematic equity strategies, which are complementary, allows a move up the efficient frontier, with a higher level of return at every level of risk. MS. SHORES concluded that the exercise of combining index factors and alpha requires introspection and a bit of math, but it can have a good payoff.

13. OVERDIVERSIFICATION

MR. MITCHELL introduced State Street to present on overdiversification, which he described as the potential of picking too many investment mandates and ending up with expensive asset investments. GAURAV MALLIK said that the focus was mainly on the number of active managers, and the presentation is based on a paper written by his colleagues, ROB SHAPIRO, SHAWN MCKAY, and RIC THOMAS called “What Free Lunch? The Cost of Overdiversification,” which asserts that too much diversifying can result in paying too much for what looks like expensive index investments.

MR. MALLIK said that diversification is intrinsic to what investors do in allocating assets and in

selecting managers. Overdiversification may result from not wanting to put more than a certain amount of money into a single manager or not wanting to own more than a certain percent of a manager's assets. These constraints and others may lead to having more managers than desired in the portfolios. Some negative effects of this are that it minimizes or reduces tracking error for active risk, and such diversification can result in something similar to the index fund, but with fees. MR. MALLIK showed slides comparing numbers of managers in other defined benefit plans and showed how their average active risks drop with increased numbers of managers, close to the risk of factor-based index-plus, yet for high fees.

MR. SHAPIRO explained more of the economic theory and math in the study they did, showing how combinations of portfolios have an active risk similar to that of enhanced index strategies, but with active management fees. MR. SHAPIRO compared three examples of portfolios with various levels of active risk, one low, one medium, and one high, including an analysis of fees per unit of active risk in the various combinations. He concluded that he hoped this was food for thought as the Board makes choices about their plan.

DR. JENNINGS commented that he would take the opportunity to repeat his refrain that fewer managers with larger allocations is wise.

CHAIR JOHNSON recessed the meeting from 2:58 p.m. to 3:12 p.m.

14. RISK PARITY PRESENTATION

MR. MITCHELL told how last October at the Ed Conference he had tasked Pete Hayden with answering the question, "How would a hedge fund guy invest a public pension portfolio?" The answer was basically to take less equity risk and lever up the whole portfolio. That sounded a lot like risk parity, so MR. MITCHELL asked Board members if this was something they wanted to learn more about, which led to a presentation at the December meeting. One of the conclusions was that it is worth considering allocating a small portion of the portfolio into risk parity strategies. MR. MITCHELL explained that he thought another educational presentation would be prudent prior to the strategic asset allocation discussion in June, so GREGOR ANDRADE and ZACHARY MEES from AQR are presenting on risk parity.

MR. ANDRADE explained that AQR is an alternatives manager, and they manage hedge funds. They realized in the mid-2000s that they should diversify their portfolio, so they designed a strategy for themselves which is now called risk parity. Risk parity is about asset allocation, the main goal of which is to achieve the return objectives with an acceptable amount of risk. Contrasting risk parity with traditional asset allocation, instead of allocating capital to different geographies and asset classes, risk parity allocates risk. This results in quite different portfolios, and has important implications for how the portfolio behaves in bad times and in the long run.

MR. ANDRADE showed pie charts demonstrating that a portfolio with capital apparently diversified may be heavily weighted toward equities for risk. He explained that precisely estimating the risk of an asset is very important in risk parity, and it is important to be able to rebalance, so in practice, managers tend to focus this as a liquid part of their portfolio. The premise is that the pie chart of risk

should not be dominated by any one thing; the risks should be balanced.

MR. ANDRADE acknowledges that no one can forecast risk exactly, but by attempting to forecast risk and changing exposures to keep risk steady, overall risk can be kept within a tighter range so it doesn't explode in bad times or collapse in times of low volatility. He said there are two or three different ideas why risk parity works, but they all result in similar portfolios. He explained some assumptions that lead to risk parity: the belief that no liquid asset class is superior to any other, and assets that have higher returns have higher risk; the realization that while asset classes may not be superior to each other, they do work at different times; and market timing is really hard.

MR. ANDRADE said that leverage is inherent to every risk parity portfolio, and that is why everyone doesn't do it. Some people feel that leverage is like taking out a home equity loan to go to a casino, as MR. WILLIAMS said. MR. MEES replied that it is fairly low leverage, about 200 to 300 percent, and the amount of capital that has to be freed up to get that leverage is pretty small. MR. ANDRADE added that the leverage allows exposure to assets that behave better in different economic environments, so the likelihood of a significant loss is lower. He concluded that they think a portfolio well-diversified by risk parity can, over the long term, outperform a traditional allocation by about 150 basis points. However, because the portfolio is so different from the traditional allocation, it has a large tracking error, and it may take a long time horizon to see an outperformance.

RECESS FOR THE DAY

CHAIR JOHNSON recessed the meeting for the day at 3:58 p.m.

Friday, April 5, 2019

CALL BACK TO ORDER

CHAIR JOHNSON reconvened the meeting at 9:00 a.m. on Friday, April 5.
All Board members were present.

15. PORTFOLIO RISK MANAGEMENT (TRUVIEW +)

ZACH HANNA, deputy chief investment officer, talked about the ARM Board's risk management tools and compared them with public pension fund peers. He said that risk is anything that impacts the primary objective of retirement systems to pay benefits when they are due, and it encompasses both assets and liabilities. Setting and monitoring investment risk is one of the primary roles of the ARM Board.

MR. HANNA said that the ARM Board and staff work to identify and understand the implications of significant risks, which can be categorized into compensated and uncompensated. Compensated risks should be set at appropriate levels, and uncompensated risks should be diversified and managed to minimize them as much as possible. Risks should be monitored regularly for changing conditions and points of control.

MR. HANNA said that the most significant risk management actions the Board takes are setting actuarial assumptions and the asset allocation. The main sources of control are rebalancing across asset classes and ongoing feedback into the annual asset allocation process.

MR. HANNA showed the ARM Board's actuarial assumptions over time alongside an average of 170 public pension fund peers using data from NASRA, the National Association of State Retirement Administrators. The ARM Board's nominal return assumption has been as high as 9 percent and has been reduced in the current lower return environment, and the inflation assumption has also decreased over time. But since inflation has fallen faster than nominal returns, the real rate of return has actually risen. MR. HANNA discussed other comparisons with pension fund peers, and showed that the ARM Board asset allocation is in the upper quartile, with 1.08 times the risk and 1.04 times the expected return, and the asset allocation that was adopted was consistent with that. The real challenge is figuring out the right level of risk and return that best balances current and future benefit obligations with the plan's ability to bear risk and the desire for low and stable contributions. The actuaries are conducting an experience study, and Callan is doing an asset liability study, which should offer helpful insights.

MR. HANNA discussed liquidity and current and future inflows and outflows. His definition of liquid assets are purely public equities plus fixed income, and he noted that the ARM Board has quite a few liquid assets among their alternative strategies. Liquidity is important for rebalancing and maintaining the Board's strategic asset allocation, especially during extreme equity drawdowns. The analysis showed that if there were a 45 percent drawdown, the ARM Board would need about 4 percent more fixed income than they currently have to be able to fully rebalance.

MR. HANNA said that for risk monitoring analytics they use State Street's truView+ risk system, which can help answer important questions about risk exposure, asset allocation, diversification, likely performance in historic market events and scenarios, and the probability and magnitude of potential losses. He explained how the data is used to estimate risk and showed some comparisons of the risk of the ARM Board public equity portfolios, saying that overall risk was dominated by equity investments. He said that the measured level of compensated risk is not materially different from what the ARM Board has adopted as its strategic asset allocation.

Trustees asked some questions about how private equity was evaluated, and MR. HANNA explained that they proxy private equity with the Callan proxy, probably with a risk proxy that is higher than would really be observed. Real assets and absolute return are handled similarly, using a model instead of actual ARM Board holdings. MR. HANNA said that there is no standard for evaluating private equity, but they look at diversification across sectors, countries, and strategies that it is exposed to. He added that they are trying to take a more unified approach to looking at illiquid investments through a risk lens and hope to make measurable improvement.

16. CIO UPDATE

MR. MITCHELL noted that he had included some information that he might not have otherwise for the benefit of the newer Trustees. He reiterated that for his past couple of years as CIO, his focus has been on net-of-fee outcomes. He said that they look at six-year periods as a focusing tool to think

about the contribution of each element in the portfolio. He reminded everyone that last June, during the annual strategic asset allocation presentation, he mentioned that over the course of the following years, the Board would consider the role that private equity, real estate, and absolute return play in the portfolio. In December he presented information on an attempt to create a public equivalent portfolio to answer the question of whether the plan is getting something unique in the fullness of time from these alternative investments. He said that this presentation was intended to wrap up his thinking on alternatives and he hoped to receive feedback from the Board that he could take to the IAC, Callan, and staff as they work to formulate options for the June strategic asset allocation meeting. He noted that he thinks they should consider ways to simplify the structure of the portfolio and to make consequential decisions.

MR. MITCHELL showed charts of the assets under management by the ARM Board, the total value of which as of June 30, 2018 were a little over \$32 billion. He reviewed unfunded liability and return expectations and explained how the calculations were made. MR. MITCHELL recommended a series of steps for the strategic asset allocation discussion, starting with a new one, articulating the time horizon. The next step is to identify the asset classes, and then calibrate Callan's capital market assumptions to be relevant over that time horizon and those asset classes. Then the most risk-efficient options can be identified for the Board to consider. The last step he proposed, also new, is the establishment of a policy portfolio that would be comprised solely of publicly traded stocks and bonds and have the same risk profile as for the optimal asset allocation. This portfolio would be virtual, not real, and would provide another measure of return information over time to help evaluate the impacts that alternatives have had in the return performance of the ARMB portfolio.

MR. MITCHELL described the time horizon as the ability to take a punch, to absorb a once-in-20-years event and stick around long enough for the markets to recover. He discussed how to establish an appropriate time horizon, and noted that since 2014 when they recalculated the amortization tables, they have been targeting to be fully funded by 2039, so all of the payments are calibrated based on that, and will continue to be despite the fact that the fund has adopted layering. The longer the time horizon, the less risk needs to be taken.

MR. MITCHELL proposed doing everything in their power to evaluate what they are paying versus what they are getting and to reduce costs, because every basis point of fees reduced at the portfolio level is a basis point of additional return. He noted that he doesn't want to minimize fees, but rather to maximize net-of-fee outcomes. He also pointed out that the fund has 10 percent fixed income, all in Treasuries. If the amount of fixed income were materially higher, they could invest more broadly in investment-grade U.S. dollar bonds, which has a yield 60 basis points higher. He went on with many examples of various scenarios, and discussed his ideas for changes to the portfolio. He concluded with recommendations, including talking about the real assets portfolio with the new consultant and bringing any recommendations back to the Board; discontinuing absolute return; being thoughtful about alternative strategies; and collapsing the 10 percent allocation to fixed income and 1 percent allocation to cash into one for simplicity.

MR. MITCHELL then discussed manager structure, noting how much time is spent on monitoring the various managers, and argued that simpler is better; therefore, he recommends termination of several strategies.

CHAIR JOHNSON recessed the meeting from 10:31 a.m. until 10:42 a.m.

MR. MITCHELL reviewed his key points for reactions from Trustees, who made comments and asked questions.

17. MANAGER SELECTION/MONITORING AND WATCH LIST

SHANE CARSON described the process of selecting managers and reviewed the evaluation criteria. He explained how staff gathers information, emphasizing that the interviewing process is very important in getting a sense of the culture within the firm. He explained the methodology and frequency of the monitoring process, which differs for each asset class, and said they also monitor the investment style of the managers to make sure they are staying within the stated or expected style. Staff does onsite due diligence including interviews throughout the firm and tours of their facilities. Also, managers give periodic presentations to the Board, which allows Trustees to familiarize themselves with the managers and to ask questions or address concerns.

MR. CARSON explained that the watch list guidelines provide a formal mechanism for staff to communicate to the Board that an issue has been identified, and staff is working to resolve it. The guidelines don't apply to closed-end funds where there is no true exit or to separate accounts like timberland, farmland, and real estate, but index funds are always watched with high scrutiny, because any small deviations need to be explained. He cautioned that it's important to understand why the rules-based mechanism of the watch list has flagged a certain manager or performance before jumping to terminate them. The watch list is a procedural step, not a trial; also, the Board may terminate a manager who hasn't been on the watch list at its own discretion at any time. The CIO is not delegated to terminate an investment manager, but is delegated to allocate away from that manager significantly. If the CIO found something that was unacceptable, he could pull money from that manager, and then come to the Board and ask for termination at the next meeting, or even call a special Board meeting to address the issue. MR. MITCHELL pointed out that for illiquid investments, the ability to exit the relationship varies; for example, in private equity, it may be many years in the future.

MR. CARSON emphasized that manager monitoring is ongoing, and that inclusion on the watch list does not require terminating a manager. The guidelines provide both quantitative and qualitative testing, and the qualitative tests each require some degree of discretion.

MR. CARSON went over a red-line and a final version of changes that staff are suggesting changes to the watch list guidelines which were adopted in 2012. One change is adding a statement of the purpose of the watch list: "The watch list guidelines are established for the purpose of providing staff a mechanism to communicate formal notification to the Board and any investment manager for whom an issue has been identified and that staff is working to resolve the issue." Another significant change is removing language regarding the performance objectives, because they are not currently relevant at the manager level and may not be achievable. Also, it is recommended to allow staff to determine the significance of the violation and recommend a resolution. MR. CARSON said that the most impactful change they are recommending is to change the 1 percent underperformance provision to underperformance after six years net of fees, which is more stringent. Also, they recommend

removing it being necessary that all three tests be met for a manager to meet the watch list criteria, and they recommend removing the style-specific test component because staff have been moving the contractual benchmarks to the style-specific benchmarks, making it redundant.

23A. Investment Actions: Manager Watch List, Resolution 2019-01

CHAIR JOHNSON stated that the recommendation is that the Alaska Retirement Management Board adopt Resolution 2019-01, amending the Watch List Guidelines to reflect those changes detailed in the Manager Selection, Monitoring, and Watch List presentation at the April 2019 ARMB meeting.

MRS. HARBO so moved. MR. WILLIAMS seconded the motion. A roll call vote was taken, and the motion passed unanimously.

18. INTERNATIONAL EQUITIES: REVIEW OF THE INVESTMENT MANAGEMENT LIFECYCLE

MR. MITCHELL reminded the Board that it previously passed a resolution authorizing staff to invest in international equity portfolios internally. Staff intend to report at the June meeting whether they believe it is feasible to do this. There are a lot of things to consider when investing internationally, such as varying regulatory regimes, varying currencies, and many more different markets, so they've asked State Street Global Advisors, who are experienced in this area, to present to the Board the full scope of the complexities of investing in international equity markets. He introduced DANIEL MORGAN and MICHAEL PUTICA from State Street Global Markets.

MR. MORGAN introduced the presentation as a high-level overview of the investment management process infrastructure requirements, including some of the complexities of transacting in various marketplaces. He showed a pictorial of the entire life cycle of the investment process, which transcends asset classes. The first step is portfolio construction. MR. MORGAN noted that in domestic investment, the initial focus is on sector and then individual securities. When constructing an international portfolio, there is more complexity because first countries have to be selected, then information obtained. The compliance rules and corporate actions are different, and to implement plans managers have to work with various counterparties and vendors in those other countries. Transaction management and collateral management are more complicated. MR. MORGAN reviewed the infrastructure, risk and optimization tools, and governance that is necessary to invest internationally, including staff and data requirements.

MR. PUTICA discussed the risk framework, including market risk, operational risk, and legal and regulatory risk. Various risks are taken on when investing internationally, and it is important to understand, manage, and monitor those risks and to have a legal framework to audit and check compliance with regulations. Market risk is the risk of going to market and not being able to do the trade you intend to because of technology, infrastructure, or counterparty issues. Different markets have different rules that an investor needs to understand. Then there are the currency transactions before the investment can be done, and the different time zones, even different holidays, to work with, so that the operational risk can quickly eat away at any ideas investors have. MR. MORGAN noted that this is primarily intended to instruct the Board as to the magnitude of the decision they may be

making.

CHAIR JOHNSON recessed the meeting from 12:01 p.m. until 1:16 p.m.

19. IAC PRESENTATION – ARMB AND FIXED INCOME

MR SHAW discussed fixed income, how the Board is currently invested, how they should be invested, and whether internal, external, or not at all.

He said that they want to put a framework in place that incorporates the investment horizon and the liquidity of the plan. He argued that fixed income is absolutely the most complex asset class there is, with many different options within it, from overnight securities to perpetual bonds, zero coupons, callables, putables, inverse floaters, and many others.

MR. SHAW said that the next issue is what role fixed income should play, from diversification to liquidity protection to income generation. He emphasized that the goal is to have the ability, in as many markets as possible, at all times to be able to get out of an investment. During difficult times, liquidity tends to dry up, because people don't want to buy. Fixed income also has a protective role in downside events, because it doesn't go up and down with everything else. He pointed out that since November, the yield curve has been moving toward being inverted, which tends to happen about 12 to 19 months ahead of a recession, and the current period of economic expansion is the second longest in U.S. history. He noted that unemployment is very low, and employers are having trouble finding workers with the skills they need, which could lead to wage inflation. He said that overall he thinks the economy is stable, but probably headed for a recession.

MR. SHAW said that with all those conditions, it might be a chance for some tactical rebalancing, but he cautioned that tactical shifts require decisions about when and how much to shift, and the same on the other side, most of which have to be correct for it to work. He said that investing is a belief system, and it's better to just stick to one strategy than to make tactical bets.

In fixed income corporate bonds, there are investment grade and high yield, with high yield correlating more to equities. Treasuries offer much more protection and opportunity to rebalance back into other asset classes. He pointed out that staff has proven the skills to run money in-house on fixed income for at least a decade across all major segments within U.S. fixed income. Deciding which segments to invest in is the question. There are many different markets, and investing in other countries requires custody relationships and dealing with currency issues and so on. He said that the four segments shown in his presentation are laid out in order of easiest to most difficult, but staff has run each one at various points in time. Whether U.S. Treasuries or Bloomberg Barclays Aggregate, it provides diversification and different levels of capital preservation and liquidity, and is cost effective to run internally. It is also the asset class with the lowest return, so it offers the most bang for the costs of going internal. He concluded by saying that if fixed income is going to be a diversifier, it should not be correlated with stocks.

20. CYBER SECURITY UPDATE

MR. MITCHELL explained that cyber security is a key risk that must be protected against, and it consumes a lot of resources collectively, therefore is a topic on which the Board should be periodically updated and educated. AJAY DESAI and SCOTT JONES were joined by MARK BREUNIG, the chief technology officer at the state Office of Information Technology (OIT) on the telephone. MR. JONES said that their plan would be to present regularly, maybe every other meeting; today would be an overview to help new Board members understand where the Board has exposure, what type of exposure, and what is at risk. In the future they hope to have representatives from other agencies or third-party contractors that the ARM Board deals with present on how they manage the physical and cybersecurity risks and mitigate the risk that the ARM Board is exposed to.

MR. JONES classified risks as internal to the State of Alaska and external, and described many types of risks: improper permissions, improper or inadequate business continuity plans, disaster recovery, loss of information or data, unauthorized access to information. Within the state, there is exposure through the Treasury Division and the Division of Retirement and Benefits. Security for both of these divisions is provided and controlled by the Department of Administration.

MR. JONES said that physical access is controlled by the Division of General Services, and the Office of Information Technology generally controls all other aspects of IT security, although his Treasury Division consists of only him and one other person, and they don't have IT staff.

MR. DESAI stated that Alaska Statute 44.21 designates the Commissioner of the Department of Administration with the responsibility for oversight of all State of Alaska executive branch information technology. The OIT provides core information technology services to all state agencies. It provides the underlying hardware, software, network infrastructure, and enterprise services. He said that the pension and health plans administered by DRB must adhere to strict standards to protect members' personal identifiable information (PII) and health information protected under HIPAA. The OIT publishes policies and procedures regarding the handling of PII and HIPAA, which DRB strictly follows and works closely with contractors to make sure they follow too.

MR. DESAI said that for risk management, business owners must implement a formal risk assessment and management process in collaboration with the State Security Office and the Division of Risk Management, and SSO personnel ensure annually that the requirements are met and check to identify vulnerabilities for the Department. MR. JONES said examples of things that could be at risk if someone accessed them include confidential contracts, proprietary information, non-public investment information, and there is a risk of unauthorized or improper trading or access to accounts.

MR. WEST asked if penetration testing is done by third parties; MR. DESAI said he believes so, but he would follow up to make sure. He discussed requirements that are specific to the DRB and internal policies and safeguards that are in place. He explained how physical security limits access to offices and computers through security badges and key cards, and they do annual training with a test for safe data handling that all DRB staff have to pass before they are authorized to view or touch any DRB data. Access to the DRB website requires going through multiple firewalls and authentication points, and member data received by e-mail is encrypted.

MR. JONES said that areas of exposure external to the state include external investment managers, actuaries, books of record, external auditors, and indirect exposure through Aetna, Moda, and PayFlex.

Office of Information Technology Security

MARK BREUNIG from the OIT explained how the evolution of technology has increased the number of external threats, and the attacks on Mat-Su and Valdez show that Alaska is a target for cyber attackers. The mission for the Information Security Office (ISO) is to ensure that robust security is provided for all of the State of Alaska for the information collected, processed, transmitted, and disseminated in general support systems. He reviewed the ISO objectives, which are based on the CIA triad, which stands for confidentiality, integrity, and availability, the foundational concepts of information security. He said that the office has implemented new endpoint detection and response tools which allow much quicker containment of any viruses or malware, and they are continuing to develop and enhance it. They also provide security awareness training for all state employees, and they have enhanced threat protection and filtering for e-mail coming into the State of Alaska e-mail system. They have installed new network border security to protect against malicious internet domains. He said that they continue to develop their systems and are looking to standardize and implement government and industry security frameworks at an enterprise level for more uniformity, and they continue to educate staff on new threats and to assist agencies in meeting their compliance standards and requirements for external data handling.

DRB IT Modernization Status Report

MR. DESAI updated the Board on DRB's IT modernization project, the primary goal of which is to create an integrated, enterprise-wide system that supports all of the core business functions for pension and health plans. It will provide modern tools that will enable the state to maintain and improve its services to members, and will integrate core business processes, facilitate consistency, and enable additional oversight and accountability. They received a budget approval for the project in 2018, and the first step was to seek an appropriate project management company that specializes in IT and state employee benefits and public retirement plans in the U.S. They have signed an agreement with Linea, and they held initial sessions for identifying requirements in March. The next step will be seeking a vendor for an enterprise-wide solution.

CALLAN ON THE DC PLAN - POSTPONED FROM ITEM NO. 9

MR. ERLENDSON stated that about 20 percent of the assets under the ARM Board's purview are in defined contribution plans. About another \$260 million flowed into DC assets between February of last year and this year, and there was actually cash outflow on a net basis in the pension fund in terms of market values. About 56 percent of the assets are in target date funds, for which people don't need to make asset allocation decisions. MR. ERLENDSON said that in most plans only about one third of assets are in target funds, so Alaska is ahead of most other plans with members deferring decisions about manager selection and asset allocation to professionals, and they think that's the way the industry will go, because most people are overwhelmed trying to make choices.

STEVE CENTER showed charts of the distributions of investments in the various DC plans. PERS and TRS both have about 60 percent of the assets in target date funds, which are the default options for participants, and the rest split among the active and passive options and the specialty options. He said that most of the plans are in a positive inflow state, but had a negative market movement in the fourth quarter. The deferred compensation plan has only about 25 percent in target date funds, and is in a cash-flow-negative state. The SBS fund, the largest of the funds at about \$3.7 billion, also has about 60 percent in target date funds and had net outflows in the last quarter. He showed ratings for each investment option and discussed their performances.

MR. WEST commented that most of the target date funds that he is familiar with are pretty close to stable value funds by the time they reach maturity. He was concerned that the plans continue to offer an ever more limited group of balanced funds or target date funds, and maybe not offering enough other choices. He speculated that the fact that people are just going into the default funds and riding them up and down might show a lack of understanding, and he questioned why Callan characterized it as a good thing.

MR. ERLENDSON said that some plans have hundreds of options, which is a nightmare for the average person to figure out, but typically there are five times as many equity options on a plan as other options. Alaska has created an easier menu of options, and has made big efforts to educate participants to understand the potential risks and opportunities, but the average behavior of corporate DC participants is for well over half to stay in the default investment and not even look at the options. MRS. HARBO remarked that it's not that they're not intelligent or well-educated; it's that people in new jobs, especially teachers, are overwhelmed with so many things to do that the easy way out is to take the default. Also, she noted that in the DC plan, a lot of people are leaving the system and taking their money out after five years.

MR. ERLENDSON pointed out that the options available in Alaska's plan are among the least expensive in the marketplace, and every dollar that goes out in fees is a dollar that doesn't stay in the pool to compound to the benefit of the participant, so this is a major advantage for their participant base.

MR. CENTER announced some upcoming Callan events, including a workshop in San Francisco in June about liquidity in retirement plans and also in endowments and foundations, and another session of Callan College coming up in July in San Francisco.

CHAIR JOHNSON recessed the meeting from 2:50 p.m. to 2:58 p.m.

21. EXECUTIVE SESSION

The executive session was postponed to a future meeting.

22. PROCUREMENT ACTIONS

A. RFP General Consultant 19-006

MR. MITCHELL read the committee recommendation: “The RFP Evaluation Committee recommends to the Board that staff publish a notice of intent to award the general investment consultant services contract to Callan LLC and, upon expiration of a 10-day notice period, if there are no protests, that a contract be entered into with Callan LLC.”

MRS. HARBO so moved. VICE CHAIR BRICE seconded the motion.

For the record, MR. MITCHELL noted that the RFP Committee is comprised of MR. BRICE and MRS. HARBO from the ARM Board, and KATHY LEA and BOB MITCHELL.

A roll call vote was taken, and the motion passed unanimously.

B. RFP Real Assets Consultant 19-007

MR. MITCHELL described how the committee reviewed the consultant applicants and read the recommendation: “The RFP Evaluation Committee recommends to the Board that staff publish a notice of intent to award the real assets consulting services contract to Callan LLC, and, upon expiration of a 10-day notice period, if there are no protests, that a contract be entered into with Callan LLC.”

MRS. HARBO so moved. VICE CHAIR BRICE seconded the motion.

MR. MITCHELL explained that it is not a real estate contract anymore, as real estate comprises only about 30 percent of the broader real asset class. In the past, the general consultant oversaw the non-real estate components of real assets, which created difficulty in having a unified view on the asset class. Therefore, staff recommended changing the scope of the contract from real estate only to include all of real assets, the entire asset class.

A roll call vote was taken, and the motion passed unanimously.

C. RFS Investment Advisor 19-009

MR. MITCHELL explained the RFS (request for services) to seek a replacement for BOB SHAW as an IAC member. MR. SHAW’s term expires on June 30th, and he does not intend to seek reappointment. Alaska Statute provides for three to five Investment Advisory Council members, and with Mr. Shaw’s departure they would have only two. The three advisory positions are designated by areas of expertise: an academic advisor, an advisor with experience as trustee manager of a public fund or endowment, and an advisor with experience as a portfolio manager. MR. SHAW holds seat one, which is designated for a person with experience and expertise in financial investments and management of investment portfolios for public, corporate, or union pension benefit funds, foundations, or endowments.

MR. MITCHELL recommended that the Board direct staff to advertise and solicit applications from persons interested in serving on the Investment Advisory Council.

MRS. HARBO so moved. VICE CHAIR BRICE seconded the motion. With no objections, staff will go forward with the recommendation.

23. INVESTMENT ACTIONS

A. Manager Watch List: Resolution 2019-01

Resolution 2019-01 was addressed under No. 17.

B. DC Real Assets

MR. MITCHELL reminded Board members that at the September 26 meeting, Callan had presented their investment structure evaluation of the participant-directed plans, in which they recommended combining the existing U.S. Treasury Inflation Protected Securities Index Fund, TIPS, and the existing U.S. Real Estate Trust Index Fund, REITs, into a single multi-asset class real assets fund. MR. MITCHELL said that staff evaluated 13 strategies offered by 11 managers, and their recommendation is: “The Alaska Retirement Management Board direct staff to contract with BlackRock to offer the Strategic Completion Fund in the Alaska Supplemental Annuity Plan, the Defined Contribution Retirement Plans (PERS Tier IV, TRS Tier III) and the Deferred Compensation Plan subject to successful contract and fee negotiations. Additionally, the Alaska Retirement Management Board direct staff to map participant assets from the existing U.S. Real Estate Investment Trust Index Fund and the U.S. Treasury Inflation Protected Securities Index Fund into the Strategic Completion Fund once satisfying appropriate participant notification requirements.”

MRS. HARBO so moved. MR. WILLIAMS forwarded the recommendation on behalf of the committee.

In response to a question from MR. HIPPLER, MR. MITCHELL said that after this action is completed, there would not be a REIT or a TIPS option available to participants. MR. WEST stated for the record that he believes this recommendation has two steps, and while he likes and would support the BlackRock fund, he does not support the arbitrary decision to map some 14,000 participants over to this new fund with any understanding of their wishes.

In response to a question from CHAIR JOHNSON, MR. MITCHELL stated that the existing fees for the TIPS and REITs strategies respectively are about 6 to 9 basis points, and the fee currently contemplated for the BlackRock strategy is 11 basis points if the existing assets get mapped to the new assets, but would be 17 basis points if that were not the case. VICE CHAIR BRICE explained that although about 13,000 people use these funds, they don’t put much money into them, so they hope to have some compression of those options in a higher value fund that has shades of both the REITs and the TIPS.

A roll call vote was taken, and the recommendation was approved by a vote of 7 to 2.

C. Investment Guideline Revision: Resolution 2019-02

MR. MITCHELL explained that in January of 2017, the ARM Board had reinitiated a securities lending program with State Street. In 2018, the ARM Board hired PineBridge to manage a global tactical asset allocation mandate, the guidelines of which prohibit lending securities. However, the language was not intended to limit the availability of securities held in this portfolio from the ARM Board's securities lending program. Therefore, to clarify that portfolio securities are available to participate in the ARM Board securities lending program, staff recommended changes to PineBridge's investment guidelines.

MR. MITCHELL stated that staff recommended that the ARM Board adopt Resolution 2019-02, which adopts the revised Global Dynamic Asset Allocation Investment Guidelines.

MRS. HARBO so moved. MR. WEST seconded the motion.

A roll call vote was taken, and Resolution 2019-02 was adopted unanimously.

UNFINISHED BUSINESS

CHAIR JOHNSON said that he would appreciate Trustees joining some of the four committees of the Board, and specifically he requested that MR. BRETZ consider joining the Audit Committee. He asked people to let him know.

NEW BUSINESS

MR. MITCHELL suggested that an Investment Advisory Council Committee should be formed for the purpose of evaluating responses to the RFP that has been approved to replace MR. SHAW. MRS. HARBO, MR. WILLIAMS, and VICE CHAIR BRICE volunteered.

MR. MITCHELL said that the Actuarial Committee needs a chair elected, and noted that the Actuarial Committee is virtually a committee of the whole. MRS. HARBO nominated NORM WEST. MR. WILLIAMS seconded the motion. MR. WEST accepted, and with no objections from the Trustees, CHAIR JOHNSON congratulated him as the new chair of the Actuarial Committee.

MRS. HARBO requested to see a pie chart of the internally managed funds. MR. MITCHELL said he had noted that request.

OTHER MATTERS TO PROPERLY COME BEFORE THE BOARD

None.

PUBLIC/MEMBER COMMENTS

None.

INVESTMENT ADVISORY COUNCIL COMMENTS

None.

TRUSTEE COMMENTS

MRS. HARBO thanked the new Trustees for the interest they have shown in this meeting and welcomed them.

FUTURE AGENDA ITEMS

None noted.

ADJOURNMENT

There being no objection and no further business to come before the board, the meeting was adjourned at 4:00 p.m. on April 5, 2019, on a motion made by MRS. HARBO and seconded by VICE CHAIR BRICE.

Chair of the Board of Trustees
Alaska Retirement Management Board

ATTEST:

Corporate Secretary

Note: An outside contractor recorded the meeting and prepared the summary minutes. For in-depth discussion and more presentation details, please refer to the recording of the meeting and presentation materials on file at the ARMB office.

Confidential Office Services
Karen Pearce Brown
Juneau, Alaska

ALASKA RETIREMENT MANAGEMENT BOARD
STAFF REPORT
Division of Retirement & Benefits Report
June 20, 2019

Summary of Monthly Billings / Buck –

Attached for your information are the quarterly payments related to actuarial services provided by the Division's consulting actuary, Buck.

Items listed represent regular and non-regular costs incurred under our current contract with Buck.

The listed costs are charged to the System or Plan noted on the column headings.

Summary through the Nine months ended March 31, 2019

New for this quarter are cost associated to the EGWP cost analysis, Asset / Liability Modeling information for Callan, and the Senate Finance Committee presentation.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	<u>Summary of Monthly Billings -</u>	ACTION:	<u> </u>
	<u>Buck</u>		
DATE:	<u>June 20, 2019</u>	INFORMATION:	<u>X</u>

BACKGROUND:

AS 37.10.220(a)(8) prescribes that the Alaska Retirement Management Board (Board) “coordinate with the retirement system administrator to have an annual actuarial valuation of each retirement system prepared to determine system assets, accrued liabilities, and funding ratios....”

As part of the oversight process, the Board has requested that the Division of Retirement & Benefits provide quarterly summary updates to review billings and services provided for actuarial valuations and other systems’ request.

STATUS:

Attached are the summary totals for the nine months ended March 31, 2019.

Buck
Billing Summary
For the Three Months Ended September 30, 2018

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial valuations	\$ 77,700	31,546	4,481	11,495	-	-	-	-	-	\$ 125,222
KPMG audit information request	5,125	2,091	36	174	-	-	-	-	-	7,426
ARMB presentations and meeting attendance	100,265	40,915	715	3,413	-	-	-	-	-	145,308
FY20 final PERS/TRS contribution rates	9,693	3,956	-	-	-	-	-	-	-	13,649
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	19,527	8,632	197	1,005	-	-	-	-	-	29,361
GASB 68 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	9,505	4,201	96	490	-	-	-	-	-	14,292
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/JRS)	18,682	6,937	62	-	-	-	-	-	-	25,681
GASB 75 valuation reports as of 6/30/17 (PERS/TRS/JRS)	1,852	689	6	-	-	-	-	-	-	2,547
TOTAL	\$ 242,349	98,967	5,593	16,577	-	-	-	-	-	\$ 363,486
For the Three Months Ended September 30, 2017	\$ 84,243	33,373	1,865	599	-	-	23	745	185	\$ 121,033

For the Three Months Ended December 31, 2018

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial Valuations	\$ 45,115	39,150	2,005	19,477	-	-	-	-	-	\$ 105,747
KPMG audit information request	10,052	4,101	73	342	-	-	-	-	-	14,568
ARMB presentations and meeting attendance	36,368	14,840	260	1,238	-	-	-	-	-	52,706
Attendance and preparation for October NYC ARMB Investment Education Conference	782	319	5	26	-	-	-	-	-	1,132
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	28,234	12,482	285	1,454	-	-	-	-	-	42,455
GASB 68 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	29,652	13,108	298	1,527	-	-	-	-	-	44,585
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/JRS)	44,491	16,522	147	-	-	-	-	-	-	61,160
GASB 75 valuation reports as of 6/30/17 (PERS/TRS/JRS)	33,443	12,421	110	-	-	-	-	-	-	45,974
TOTAL	\$ 228,137	112,943	3,183	24,064	-	-	-	-	-	\$ 368,327
For the Three Months Ended December 31, 2017	\$ 288,798	166,622	596	2,005	-	-	7	510	126	\$ 458,664

For the Three Months Ended March 31, 2019

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial valuations	\$ 68,477	37,164	7,619	10,260	-	-	-	-	-	\$ 123,520
ARMB presentations and meeting attendance	29,168	11,903	208	993	-	-	-	-	-	42,272
ARMB meeting follow-up request	3,277	1,336	23	112	-	-	-	-	-	4,748
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	11,576	5,118	117	596	-	-	-	-	-	17,407
GASB 68 valuation reports as of 6/30/18 (PERS/TRS/JRS/NGNMRS)	8,206	3,628	83	423	-	-	-	-	-	12,340
GASB 75 valuation reports as of 6/30/18 (PERS/TRS/JRS)	6,621	2,459	22	-	-	-	-	-	-	9,102
EGWP cost analysis	7,682	2,826	19	-	-	-	24	-	-	10,551
Asset/liability modeling - Callan	15,240	6,225	-	-	-	-	-	-	-	21,465
Aleutian Region School District litigation	2,824	-	-	-	-	-	-	-	-	2,824
NGNMRS data issues regarding prior cash outs	-	-	-	15,962	-	-	-	-	-	15,962
Senate Finance Committee attendance and preparation	2,010	820	-	-	-	-	-	-	-	2,830
TOTAL	\$ 155,081	71,479	8,091	28,346	-	-	24	-	-	\$ 263,021
For the Three Months Ended March 31, 2018	\$ 235,261	163,585	1,074	2,281	912	-	5	-	-	\$ 403,118

Summary through the Nine Months Ended March 31, 2019

	PERS	TRS	JRS	NGNMRS	EPORS	AHF	RHF	SBS	DCP	TOTAL
Actuarial valuations	\$ 191,292	107,860	14,105	41,232	-	-	-	-	-	\$ 354,489
KPMG audit information request	15,177	6,192	109	516	-	-	-	-	-	21,994
ARMB presentations and meeting attendance	165,801	67,658	1,183	5,644	-	-	-	-	-	240,286
ARMB meeting follow-up request	3,277	1,336	23	112	-	-	-	-	-	4,748
Attendance and preparation for October NYC ARMB Investment Education Conference	782	319	5	26	-	-	-	-	-	1,132
FY20 final PERS/TRS contribution rates	9,693	3,956	-	-	-	-	-	-	-	13,649
GASB 67 valuation reports as of 6/30/17 (PERS/TRS/JRS/NGNMRS)	59,337	26,232	599	3,055	-	-	-	-	-	89,223
GASB 68 valuation reports as of 6/30/17 and 6/30/18 (PERS/TRS/JRS/NGNMRS)	47,363	20,937	477	2,440	-	-	-	-	-	71,217
GASB 74 valuation reports as of 6/30/17 (PERS/TRS/JRS)	63,173	23,459	209	-	-	-	-	-	-	86,841
GASB 75 valuation reports as of 6/30/17 and 6/30/18 (PERS/TRS/JRS)	41,916	15,569	138	-	-	-	-	-	-	57,623
EGWP cost analysis	7,682	2,826	19	-	-	-	24	-	-	10,551
Asset/liability modeling - Callan	15,240	6,225	-	-	-	-	-	-	-	21,465
Aleutian Region School District litigation	2,824	-	-	-	-	-	-	-	-	2,824
NGNMRS data issues regarding prior cash outs	-	-	-	15,962	-	-	-	-	-	15,962
Senate Finance Committee attendance and preparation	2,010	820	-	-	-	-	-	-	-	2,830
TOTAL	\$ 625,567	283,389	16,867	68,987	-	-	24	-	-	994,834
Summary through the Nine Months March 31, 2018	\$ 608,302	363,580	3,535	4,885	912	-	35	1,255	311	982,815

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Division of Retirement & Benefits Report June 20, 2019

Retirement System Membership Activity as of March 31, 2019 –

Attached for your information are the membership statistics for the quarter ending

- March 31, 2019

We see net increases in active members from last quarter, primarily in PERS Tier 4 and TRS Tier 3 members:

- PERS Tier 1-3 active members decreased from 13,138 to 12,948, or a decrease of 190.
- PERS Tier 4 active members increased from 21,986 to 22,569, or an increase of 583.
- PERS active members had a net increase of 393.

- TRS Tier 1-2 active members decreased from 4,503 to 4,487, or a decrease of 16.
- TRS Tier 3 active members increased from 5,947 to 5,961, or an increase of 14.
- TRS active members had a net decrease of 2.

Retiree counts have changed in the following manner:

- PERS retirees increased from 35,668 to 35,787, or an increase of 119 (Tiers 1-4).
- TRS retirees decreased from 13,278 to 13,269, or a decrease of 9 (Tiers 1-3).

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Retirement System Membership Activity
as of March 31, 2019

ACTION: _____

DATE: June 20, 2019

INFORMATION: **X**

BACKGROUND:

Information related to PERS, TRS, JRS, NGNMRS, SBS, and DCP membership activity as requested by the Board.

STATUS:

Membership information as of March 31, 2019.

MEMBERSHIP STATISTICS AS OF SEPTEMBER 30, 2018

	PERS						TRS					JRS	NGNMRS	SBS	DCP
	DB				DC	SYSTEM	DB			DC	SYSTEM				
	Tier I	Tier II	Tier III	Total	Tier IV	TOTAL	Tier I	Tier II	Total	Tier III	TOTAL				
Active Members	1,180	3,390	8,730	13,300	21,406	34,706	338	4,169	4,507	5,933	10,440	70	n/a	20,967	6,139
Terminated Members															
Entitled to Future Benefits	354	2,069	3,105	5,528	1,212	6,740	39	647	686	528	1,214	2	n/a	25,106	5,121
Other Terminated Members	1,090	2,163	7,753	11,006	12,277	23,283	264	1,591	1,855	2,199	4,054	-	n/a	n/a	n/a
Total Terminated Members	1,444	4,232	10,858	16,534	13,489	30,023	303	2,238	2,541	2,727	5,268	2	n/a	25,106	5,121
Retirees & Beneficiaries	23,674	7,891	3,887	35,452	66	35,518	10,648	2,630	13,278	19	13,297	132	706	n/a	n/a
Managed Accounts	n/a	n/a	n/a	n/a	5,608	5,608	n/a	n/a	n/a	1,501	1,501	n/a	n/a	1,824	1,987
Retirements - 1st QTR FY19	93	169	131	393	18	411	61	137	198	3	201	9	25	n/a	n/a
Full Disbursements - 1st QTR FY19	37	62	103	202	468	670	5	22	27	102	129	-	n/a	526	170
Partial Disbursements - 1st QTR FY19	n/a	n/a	n/a	n/a	73	73	n/a	n/a	n/a	19	19	n/a	n/a	1,099	568

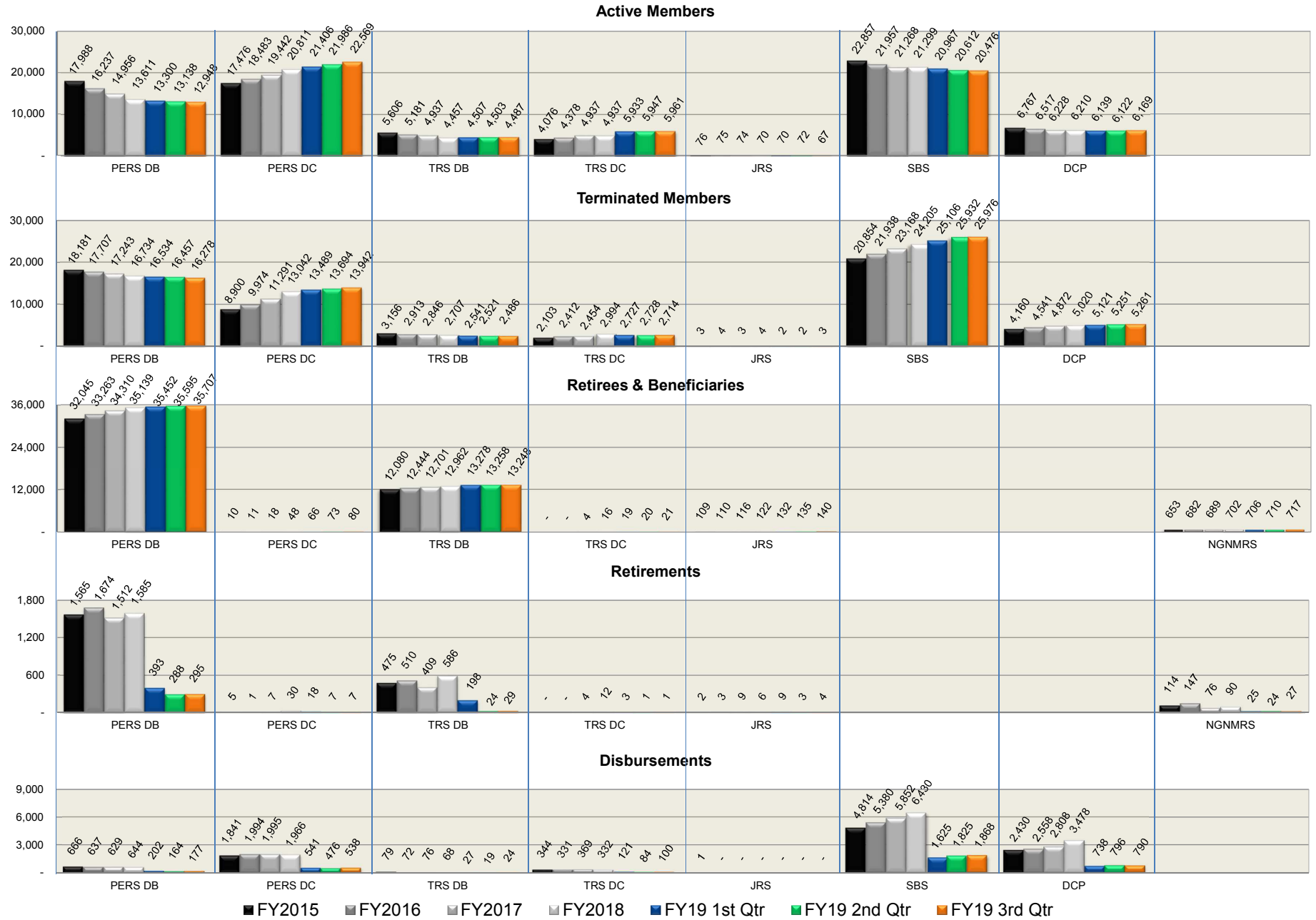
MEMBERSHIP STATISTICS AS OF DECEMBER 31, 2018

	PERS						TRS					JRS	NGNMRS	SBS	DCP
	DB				DC	SYSTEM	DB			DC	SYSTEM				
	Tier I	Tier II	Tier III	Total	Tier IV	TOTAL	Tier I	Tier II	Total	Tier III	TOTAL				
Active Members	1,144	3,338	8,656	13,138	21,986	35,124	337	4,166	4,503	5,947	10,450	72	n/a	20,612	6,122
Terminated Members															
Entitled to Future Benefits	347	2,049	3,105	5,501	1,254	6,755	37	640	677	514	1,191	2	n/a	25,932	5,251
Other Terminated Members	1,088	2,148	7,720	10,956	12,440	23,396	262	1,582	1,844	2,214	4,058	-	n/a	n/a	n/a
Total Terminated Members	1,435	4,197	10,825	16,457	13,694	30,151	299	2,222	2,521	2,728	5,249	2	n/a	25,932	5,251
Retirees & Beneficiaries	23,616	8,007	3,972	35,595	73	35,668	10,611	2,647	13,258	20	13,278	135	710	n/a	n/a
Managed Accounts	n/a	n/a	n/a	n/a	5,643	5,643	n/a	n/a	n/a	1,511	1,511	n/a	n/a	1,931	2,131
Retirements - 2nd QTR FY19	57	129	102	288	7	295	7	17	24	1	25	3	24	n/a	n/a
Full Disbursements - 2nd QTR FY19	16	57	91	164	395	559	4	15	19	68	87	-	n/a	526	136
Partial Disbursements - 2nd QTR FY19	n/a	n/a	n/a	n/a	81	81	n/a	n/a	n/a	16	16	n/a	n/a	1,299	660

MEMBERSHIP STATISTICS AS OF MARCH 31, 2019

	PERS						TRS					JRS	NGNMRS	SBS	DCP
	DB				DC	SYSTEM	DB			DC	SYSTEM				
	Tier I	Tier II	Tier III	Total	Tier IV	TOTAL	Tier I	Tier II	Total	Tier III	TOTAL				
Active Members	1,117	3,263	8,568	12,948	22,569	35,517	336	4,151	4,487	5,961	10,448	67	n/a	20,476	6,169
Terminated Members															
Entitled to Future Benefits	326	1,986	3,085	5,397	1,266	6,663	31	637	668	512	1,180	2	n/a	25,976	5,261
Other Terminated Members	1,079	2,131	7,671	10,881	12,676	23,557	256	1,562	1,818	2,202	4,020	1	n/a	n/a	n/a
Total Terminated Members	1,405	4,117	10,756	16,278	13,942	30,220	287	2,199	2,486	2,714	5,200	3	n/a	25,976	5,261
Retirees & Beneficiaries	23,505	8,128	4,074	35,707	80	35,787	10,581	2,667	13,248	21	13,269	140	717	n/a	n/a
Managed Accounts	n/a	n/a	n/a	n/a	5,658	5,658	n/a	n/a	n/a	1,521	1,521	n/a	n/a	2,026	2,258
Retirements - 3rd QTR FY19	60	125	110	295	7	302	11	18	29	1	30	4	27	n/a	n/a
Full Disbursements - 3rd QTR FY19	13	69	95	177	439	616	3	21	24	66	90	-	n/a	596	168
Partial Disbursements - 3rd QTR FY19	n/a	n/a	n/a	n/a	99	99	n/a	n/a	n/a	34	34	n/a	n/a	1,272	622

Alaska Division of Retirement and Benefits
FY 2019 QUARTERLY REPORT OF MEMBERSHIP STATISTICS
 Annual & Quarterly Trends as of March 31, 2019



LEGEND

- Active Members** - All active members at the time of the data pull,
except SBS & DCP, which are counts of contributors during the final quarter of each period.
- Terminated Members** - All members who have terminated without refunding their account,
except SBS & DCP, which are counts of members with balances at the end of the period less active members.
- Retirees & Beneficiaries** - All members who have retired from the plans, including beneficiaries eligible for benefits.
- Managed Accounts** - Individuals who have elected to participate in the managed accounts option with Empower.
- Retirements** - The number of retirement applications processed.
- Full Disbursements** - All types of disbursements that leave the member balance at zero.
- Partial Disbursements** - All types of disbursements that leave the member balance above zero. If more than one partial disbursement is completed during the quarter for a member, they are counted only once for statistical purposes.

ALASKA RETIREMENT MANAGEMENT BOARD
STAFF REPORT
Division of Retirement and Benefits Report
June 20, 2019

2019 Legislation –

Attached for your information is a list of legislation tracked by the Division of Retirement and Benefits during the 1st regular session of the 31st Alaska Legislature.

Division of Retirement & Benefits

Alaska Retirement Management Board

June 19, 2019

2019 Legislation Update

Below is a list of legislation tracked by the Division of Retirement & Benefits

Bill #	Short Description	Did it pass?	Impacts to the members and the Division
HB 5	An Act prohibiting the expenditure of state money on gender reassignment medical procedures	No	This bill didn't receive a hearing; Division is currently in litigation on related benefits
HB 11	An Act relating to participation of certain peace officers in the defined benefit and defined contribution plans of the Public Employees' Retirement System of Alaska	No	This bill didn't receive a hearing; has serious legal issues that have been brought to the sponsor's attention
HB 21	An Act relating to insurance coverage for contraceptives and related services; and relating to medical assistance coverage for contraceptives and related services	No	Negligible impact, members can already receive services as described in the bill
HB 39, Section 34	An Act making appropriations for the operating and loan program expenses of state government and for certain programs; capitalizing funds; amending appropriations; making supplemental appropriations and reappropriations	Conference Committee	Additional state contributions: (a) PERS - \$159,055,000 (b) TRS - \$141,129,000 Appropriations: (c) JRS - \$5,010,000 (d) NGNMRS - \$860,686
HB 79	An Act relating to participation of certain peace officers and firefighters in the defined benefit and defined contribution plans of the Public Employees' Retirement System of Alaska; relating to eligibility of peace officers and firefighters for medical, disability, and death benefits; relating to liability of the Public Employees' Retirement System of Alaska	No	Will move 1,800 P/F members from the DCR plans to the DB plans; last heard in House Finance Committee; will be taken up again next session

Bill #	Short Description	Did it pass?	Impacts to the members and the Division
HB 156	An Act relating to group insurance coverage and self-insurance coverage for school district employees, employees of the University of Alaska, and employees of other governmental units in the state	No	Would increase the eligibility of school districts and the University to participate in the state's employee health plan
SB 46	An Act relating to restoration of tenure for certain disabled individuals; relating to the Public Employees' Retirement System of Alaska and the teachers' retirement system; providing certain employees an opportunity to choose between the defined benefit and defined contribution plans of the Public Employees' Retirement System of Alaska and the Teachers' Retirement System	No	This bill didn't get a hearing; significant education will be required to those considering conversion and to new hires
SB 102	An Act relating to retirement incentives for members of the defined benefit retirement plan of the teachers' retirement system and the defined benefit retirement plan of the Public Employees' Retirement System of Alaska	No	There are about 10,000 combined PERS and TRS members who are already eligible for retirement; would provide additional benefits to this group; significant education will be required
SB 44	An Act relating to the prescription of drugs by a physician assistant without physical examination; relating to prescription drugs under the medical assistance program	Yes	No anticipated impact, would expand providers eligible to participate in telemedicine

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Disclosure - Calendar Update

June 20, 2019

The Disclosure Memorandum is included in the packet; no transactions require additional review or discussion.

The 2019 ARMB calendar-to-date and the drafted 2020 ARMB calendar are also attached. The 2020 ARMB calendar is up for approval.

Nothing further to report.

ALASKA RETIREMENT MANAGEMENT BOARD

2019 Meeting Calendar

DATE	LOCATION	DESCRIPTION
June 19 Wednesday	Juneau AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
June 20-21 Thursday - Friday	Juneau AK	Board of Trustees Meeting: <i>*Draft Actuary Report/Draft Actuary Certification (TBD)</i> <i>*Adopt Asset Allocation</i> <i>*Review Private Equity Annual Plan</i> <i>*Performance Measurement - 1st Quarter</i> <i>*Manager Presentations</i>
September 18 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
September 19-20 Thursday - Friday	Juneau, AK	Board of Trustees Meeting: <i>*Set Contribution Rates</i> <i>*Final Actuary Reports/Adopt Valuation</i> <i>*Audit Results/Assets – (TBD)</i> <i>*Approve Budget</i> <i>*Performance Measurement – 2nd Quarter</i> <i>*Real Estate Annual Plan</i> <i>*Real Estate Evaluation – Callan, LLC</i> <i>*Manager Presentations</i>
November 15 Friday (placeholder)	Telephonic	Audit Committee
December 11 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Defined Contribution Plan Committee Operations Committee
December 12-13 Thursday-Friday	Juneau, AK	Board of Trustees Meeting: <i>*Audit Report - (TBD)</i> <i>*Performance Measurement – 3rd Quarter</i> <i>*Manager Review (Questionnaire)</i> <i>*Private Equity Review</i> <i>*Manager Presentations</i>

ALASKA RETIREMENT MANAGEMENT BOARD

2020 Meeting Calendar

DATE	LOCATION	DESCRIPTION
January 20 Monday	Telephonic	Actuarial Committee - Preliminary FY19 Results
March 18 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Operations Committee Defined Contribution Plan Committee
March 19-20 Thursday-Friday	Juneau, AK	Board of Trustees Meeting: <i>*Performance Measurement – 4th Quarter</i> <i>*Absolute Return Annual Plan</i> <i>*Buck Draft Actuarial Report/GRS Draft Actuary Certification</i> <i>*Capital Markets – Asset Allocation</i> <i>*Manager Presentations</i>
April 30 Thursday	Telephonic	Actuarial Committee <i>*As necessary: follow-up/additional discussion/questions on valuations</i>
May 1 Friday	Telephonic	Board of Trustees Meeting <i>*As necessary</i>
June 17 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Operations Committee Defined Contribution Plan Committee
June 18-19 Thursday - Friday	Juneau, AK	Board of Trustees Meeting: <i>*Final Actuary Reports/Adopt Valuation</i> <i>*Adopt Asset Allocation</i> <i>*Review Private Equity Annual Plan</i> <i>*Performance Measurement - 1st Quarter</i> <i>*Manager Presentations</i>
September 16 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Operations Committee Defined Contribution Plan Committee Budget Committee
September 17-18 Thursday - Friday	Juneau, AK	Board of Trustees Meeting: <i>*Set Contribution Rates</i> <i>*Audit Results/Assets – Auditor</i> <i>*Approve Budget</i> <i>*Performance Measurement – 2nd Quarter</i> <i>*Real Estate Annual Plan</i> <i>*Real Assets Evaluation – Callan LLC</i> <i>*Manager Presentations</i>
October 16 Friday (placeholder)	Telephonic	Audit Committee
December 2 Wednesday	Juneau, AK	Actuarial Committee Audit Committee Operations Committee Defined Contribution Plan Committee
December 3-4 Thursday-Friday	Juneau, AK	Board of Trustees Meeting: <i>*Audit Report - DRB Auditor</i> <i>*Performance Measurement – 3rd Quarter</i> <i>*Manager Review (Questionnaire)</i> <i>*Private Equity Review</i> <i>*Manager Presentations</i>

ALASKA RETIREMENT MANAGEMENT BOARD
M E M O R A N D U M

To: ARMB Trustees
From: Stephanie Alexander
Date: June 6, 2019
Subject: Financial Disclosures

As required by AS 37.10.230 and Alaska Retirement Management Board policy relating to investment conduct and reporting, trustees and staff must disclose certain financial interests. We are hereby submitting to you a list of disclosures for individual transactions made by trustees and staff.

1st Quarter – January 1, 2019 to March 31, 2019

Name	Position Title	Disclosure Type	Disclosure Date
Michelle Prebula	State Investment Officer	Equities	03/15/2019
Michelle Prebula	State Investment Officer	Equities	03/14/2019
Michelle Prebula	State Investment Officer	Equities	04/24/2019
Greg Samorajski	State Investment Officer	Equities, Fixed Income	04/03/2019
Pam Leary	Treasury Director	Equities	04/17/2019

Summary of Portfolio Moves
March 2019 - May 2019

Item	Action	Date	Amount	Description/Summary	Authority
	Rebalance Transactions:				
1	Rebalance Retirement Funds	3/12, 3/21, 3/28, 5/30		Available upon request.	
	Futures Rolls and Adjustments:				
2	Cash Equitization - Large Cap	3/8/2019	(\$10,037,500)	Sold March 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
3	Cash Equitization - Large Cap	3/8/2019	\$10,055,385	Bought June 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
4	Cash Equitization - Small Cap	3/8/2019	(\$16,835,780)	Sold March 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
5	Cash Equitization - Small Cap	3/8/2019	\$16,890,478	Bought June 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
6	Portable Alpha - Large Cap	3/8-14/19	(\$438,152,575)	Sold March 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
7	Portable Alpha - Large Cap	3/8-14/19	\$438,093,823	Bought June 2019 S&P 500 eMini contracts.	ARMB Resolution 2017-05
8	Portable Alpha - Small Cap	3/8-14/19	\$344,038,750	Bought March 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
9	Portable Alpha - Small Cap	3/8-14/19	(\$343,690,200)	Sold June 2019 Russell 2000 eMini contracts.	ARMB Resolution 2017-05
9	Portable Alpha Cash Transfers	Multiple Dates		Multiple cash transfers for PA futures accounts to maintain margin positions.	ARMB Resolution 2017-05
	Investment Actions:				
10	McKinley Healthcare Transformation	3/12&14/2019	\$250,000,000	Invested in strategy.	ARMB action.
11	Analytic Buy/Write Strategy	3/12&14/2019	(\$250,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
12	Bloomberg Barclays US Aggregate Bond Index	3/22/2019	\$12,777,455	Invested in strategy.	ARMB action.
13	Intermediate US Treasury	3/22/2019	(\$12,777,455)	Liquidated from strategy.	ARMB action.
14	ARMB Large Cap Multi-Factor	3/28/2019	\$100,000,000	Invested in strategy.	ARMB action.
15	Intermediate US Treasury	3/28/2019	(\$100,000,000)	Liquidated from strategy.	ARMB action.
16	Russell 1000 Growth Index	4/1/2019	(\$100,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
17	Short-Term Investment Pool	4/1/2019	\$100,000,000	Invested in strategy.	ARMB Resolution 2017-05
18	Multiple Terminated Strategies	4/17/2019	(\$2,756,347)	Swept residual cash positions.	ARMB action.
19	Short-Term Investment Pool	4/17/2019	\$2,756,347	Invested in strategy.	ARMB action.
20	Tortoise Capital Advisors MLP	4/23/19 and 5/7/2019	(\$35,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
21	ARMB REIT	4/23/19 and 5/7/2019	\$35,000,000	Invested in strategy.	ARMB Resolution 2017-05
22	Advisory Research MLP	4/30/2019 and 5/14/2019	(\$35,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
23	ARMB REIT	4/30/2019 and 5/14/2019	\$35,000,000	Invested in strategy.	ARMB Resolution 2017-05
24	Lazard Emerging Income	4/25/2019	(\$60,000,000)	Liquidated from strategy.	ARMB action.
25	Short-Term Investment Pool	4/25/2019	\$60,000,000	Invested in strategy.	ARMB action.
26	Fidelity Real Estate High Income	5/13/2019	\$25,000,000	Invested in strategy.	ARMB Resolution 2017-05
27	Intermediate US Treasury	5/13/2019	(\$25,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
28	Victory Capital Management	5/15/2019	(\$40,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
29	Frontier Capital Management	5/15/2019	(\$25,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
30	Short-Term Investment Pool	5/15/2019	\$65,000,000	Invested in strategy.	ARMB Resolution 2017-05
31	Victory Capital Management	5/21/2019	(\$35,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
32	Frontier Capital Management	5/21/2019	(\$25,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
33	Short-Term Investment Pool	5/21/2019	(\$65,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
34	Fidelity Tactical Bond	5/21/2019	\$125,000,000	Invested in strategy.	ARMB Resolution 2017-05
35	Schroders ILS	5/24/2019	(\$70,000,000)	Liquidated from strategy.	ARMB Resolution 2017-05
36	Cash	5/24/2019	\$70,000,000	Invested in strategy.	ARMB Resolution 2017-05
	Announcements:				
36	Two summer interns hired.	12/24/2018		Ben Garrett and Katelyn Bushnell began working in May.	

Internally Managed Assets Under Management (as of April 30, 2019)

Mandate Name	Asset Class	Asset Value
ARMB Equity Yield	Domestic Equities	\$ 401,176,636
ARMB Futures Large Cap	Domestic Equities	\$ 4,038,951
ARMB Futures Small Cap	Domestic Equities	\$ 4,461,267
ARMB Large Cap Multi-Factor	Domestic Equities	\$ 104,697,223
ARMB Russell 1000 Growth	Domestic Equities	\$ 1,631,121,665
ARMB Russell 1000 Value	Domestic Equities	\$ 1,458,085,348
ARMB Russell Top 200	Domestic Equities	\$ 192,478,536
ARMB S&P 500 Equal Weight	Domestic Equities	\$ 395,520,235
ARMB S&P 600	Domestic Equities	\$ 157,707,054
ARMB Scientific Beta	Domestic Equities	\$ 399,321,258
ARMB US Treasury Fixed Income	Fixed Income	\$ 2,717,892,535
ARMB STOXX Minimum Variance	Opportunistic	\$ 666,390,501
Direct Private Equity	Private Equity	\$ 503,188,296
ARMB REIT	Real	\$ 258,957,068
Direct Absolute Return	Absolute Return	\$ 1,258,792,369
Short-Term Fixed Income Pool	Cash	\$ 273,651,005

Total Internal	\$	10,427,479,947	39.18%
Total DB	\$	26,617,526,533	

ALASKA RETIREMENT MANAGEMENT BOARD

STAFF REPORT

Fund Financials – Cash Flow Report June 20, 2019

Scott Jones, State Comptroller, Department of Revenue

As of April month-end, total plan assets were as follows: PERS - \$19.0 billion, TRS - \$9.1 billion, JRS - \$216 million, NGNMRS - \$41 million, SBS - \$4.1 billion, DCP - \$981 million. Total non-participant direct plans totaled \$26.6 billion, and participant-directed plans totaled \$6.8 billion. Total assets were \$33.4 billion.

Year-to-date income was \$1.6 billion, and the plans experienced a net withdrawal of \$738 million. Total assets were up 2.71% year-to-date.

Internally managed assets totaled \$10.4 billion

As of month-end, all plans were within the bands of their asset allocations.

Kevin Worley, Chief Financial Officer, Division of Retirement and Benefits

Presented is the Division of Retirement and Benefits (DRB) Supplement to the Treasury Division's Financial Report as of April 30, 2019.

DRB's supplement report expands on the ARMB Financial Report column "Net Contributions (Withdrawals)" located on pages 1 and 2. DRB reports the summary totals of actual employee and employer, State of Alaska, and other revenue contributions, as well as benefit payments, refunds / distributions, and combined administrative / investment expenditures. DRB's report presents cash inflows / outflows for the 10 months ended April 30, 2019 (page 1) and the month of April 2019 (page 2).

Also presented are participant-directed distributions by plan and by type for the 10-month period on page 3.

"Notes for the DRB Supplement to the Treasury Report" includes information for the pension and healthcare plans. Additional information regarding other income is also presented on pages 4 and 5.

**ALASKA RETIREMENT MANAGEMENT BOARD
FINANCIAL REPORT**

As of April 30, 2019

ALASKA RETIREMENT MANAGEMENT BOARD
Schedule of Investment Income and Changes in Invested Assets by Fund
Fiscal Year-to-Date through April 30, 2019

	Beginning Invested Assets	Investment Income ⁽¹⁾	Net Contributions (Withdrawals)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income ⁽²⁾
<u>Public Employees' Retirement System (PERS)</u>						
<u>Defined Benefit Plans:</u>						
Retirement Trust	\$ 9,279,978,252	\$ 441,155,862	\$ (276,107,656)	\$ 9,445,026,458	1.78%	4.83%
Retirement Health Care Trust	7,653,992,293	366,065,054	(257,963,436)	7,762,093,911	1.41%	4.86%
Total Defined Benefit Plans	16,933,970,545	807,220,916	(534,071,092)	17,207,120,369	1.61%	4.84%
<u>Defined Contribution Plans:</u>						
Participant Directed Retirement	1,041,422,342	66,433,195	82,569,230	1,190,424,767	14.31%	6.14%
Health Reimbursement Arrangement	356,026,985	18,885,435	34,587,725	409,500,145	15.02%	5.06%
Retiree Medical Plan	99,169,627	5,254,497	9,549,948	113,974,072	14.93%	5.06%
<u>Defined Benefit Occupational Death and Disability:</u>						
Public Employees	20,872,152	1,110,662	2,114,883	24,097,697	15.45%	5.06%
Police and Firefighters	9,776,610	511,572	781,378	11,069,560	13.22%	5.03%
Total Defined Contribution Plans	1,527,267,716	92,195,361	129,603,164	1,749,066,241	14.52%	5.79%
Total PERS	18,461,238,261	899,416,277	(404,467,928)	18,956,186,610	2.68%	4.93%
<u>Teachers' Retirement System (TRS)</u>						
<u>Defined Benefit Plans:</u>						
Retirement Trust	5,466,056,988	257,982,901	(216,665,647)	5,507,374,242	0.76%	4.82%
Retirement Health Care Trust	2,883,838,182	137,911,387	(98,738,596)	2,923,010,973	1.36%	4.87%
Total Defined Benefit Plans	8,349,895,170	395,894,288	(315,404,243)	8,430,385,215	0.96%	4.83%
<u>Defined Contribution Plans:</u>						
Participant Directed Retirement	442,323,051	28,207,496	28,903,159	499,433,706	12.91%	6.18%
Health Reimbursement Arrangement	105,665,716	5,570,078	8,596,289	119,832,083	13.41%	5.07%
Retiree Medical Plan	36,357,065	1,886,367	2,253,602	40,497,034	11.39%	5.03%
Defined Benefit Occupational Death and Disability	3,797,783	194,848	179,155	4,171,786	9.85%	5.01%
Total Defined Contribution Plans	588,143,615	35,858,789	39,932,205	663,934,609	12.89%	5.90%
Total TRS	8,938,038,785	431,753,077	(275,472,038)	9,094,319,824	1.75%	4.91%
<u>Judicial Retirement System (JRS)</u>						
Defined Benefit Plan Retirement Trust	176,358,294	8,519,325	(1,569,721)	183,307,898	3.94%	4.85%
Defined Benefit Retirement Health Care Trust	31,621,813	1,546,739	(303,513)	32,865,039	3.93%	4.91%
Total JRS	207,980,107	10,066,064	(1,873,234)	216,172,937	3.94%	4.86%
<u>National Guard/Naval Militia Retirement System (MRS)</u>						
Defined Benefit Plan Retirement Trust	39,449,053	1,737,432	(480,850)	40,705,635	3.19%	4.43%
<u>Other Participant Directed Plans</u>						
Supplemental Annuity Plan	3,905,659,481	218,916,490	(42,095,306)	4,082,480,665	4.53%	5.64%
Deferred Compensation Plan	938,806,799	55,308,075	(13,339,310)	980,775,564	4.47%	5.93%
Total All Funds	32,491,172,486	1,617,197,415	(737,728,666)	33,370,641,235		
Total Non-Participant Directed	26,162,960,813	1,248,332,159	(793,766,439)	26,617,526,533	1.74%	4.84%
Total Participant Directed	6,328,211,673	368,865,256	56,037,773	6,753,114,702	6.71%	5.80%
Total All Funds	\$ 32,491,172,486	\$ 1,617,197,415	\$ (737,728,666)	\$ 33,370,641,235	2.71%	5.03%

Notes:

(1) Includes interest, dividends, securities lending, expenses, realized and unrealized gains/losses

(2) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates and can be found at: <http://www.revenue.state.ak.us/treasury/programs/programs/other/armb/investmentresults.aspx>

ALASKA RETIREMENT MANAGEMENT BOARD
Schedule of Investment Income and Changes in Invested Assets by Fund
For the Month Ended April 30, 2019

	Beginning Invested Assets	Investment Income (1)	Net Contributions (Withdrawals)	Ending Invested Assets	% Change in Invested Assets	% Change due to Investment Income (2)
<u>Public Employees' Retirement System (PERS)</u>						
Defined Benefit Plans:						
Retirement Trust	\$ 9,317,512,197	\$ 168,514,820	\$ (41,000,559)	\$ 9,445,026,458	1.37%	1.81%
Retirement Health Care Trust	7,650,349,951	139,143,863	(27,399,903)	7,762,093,911	1.46%	1.82%
Total Defined Benefit Plans	16,967,862,148	307,658,683	(68,400,462)	17,207,120,369	1.41%	1.82%
Defined Contribution Plans:						
Participant Directed Retirement	1,149,612,056	32,311,140	8,501,571	1,190,424,767	3.55%	2.80%
Health Reimbursement Arrangement	398,460,080	7,263,014	3,777,051	409,500,145	2.77%	1.81%
Retiree Medical Plan	110,921,435	2,021,695	1,030,942	113,974,072	2.75%	1.81%
Defined Benefit Occupational Death and Disability:						
Public Employees	23,435,057	427,277	235,363	24,097,697	2.83%	1.81%
Police and Firefighters	10,787,508	196,449	85,603	11,069,560	2.61%	1.81%
Total Defined Contribution Plans	1,693,216,136	42,219,575	13,630,530	1,749,066,241	3.30%	2.48%
Total PERS	18,661,078,284	349,878,258	(54,769,932)	18,956,186,610	1.58%	1.88%
<u>Teachers' Retirement System (TRS)</u>						
Defined Benefit Plans:						
Retirement Trust	5,442,476,277	98,387,536	(33,489,571)	5,507,374,242	1.19%	1.81%
Retirement Health Care Trust	2,881,162,149	52,394,473	(10,545,649)	2,923,010,973	1.45%	1.82%
Total Defined Benefit Plans	8,323,638,426	150,782,009	(44,035,220)	8,430,385,215	1.28%	1.82%
Defined Contribution Plans:						
Participant Directed Retirement	481,509,906	13,760,910	4,162,890	499,433,706	3.72%	2.85%
Health Reimbursement Arrangement	116,639,616	2,126,250	1,066,217	119,832,083	2.74%	1.81%
Retiree Medical Plan	39,502,463	719,717	274,854	40,497,034	2.52%	1.82%
Defined Benefit Occupational Death and Disability	4,071,904	74,181	25,701	4,171,786	2.45%	1.82%
Total Defined Contribution Plans	641,723,889	16,681,058	5,529,662	663,934,609	3.46%	2.59%
Total TRS	8,965,362,315	167,463,067	(38,505,558)	9,094,319,824	1.44%	1.87%
<u>Judicial Retirement System (JRS)</u>						
Defined Benefit Plan Retirement Trust	180,762,753	3,265,524	(720,379)	183,307,898	1.41%	1.81%
Defined Benefit Retirement Health Care Trust	32,394,211	588,529	(117,701)	32,865,039	1.45%	1.82%
Total JRS	213,156,964	3,854,053	(838,080)	216,172,937	1.41%	1.81%
<u>National Guard/Naval Militia Retirement System (MRS)</u>						
Defined Benefit Plan Retirement Trust	40,142,118	696,555	(133,038)	40,705,635	1.40%	1.74%
<u>Other Participant Directed Plans</u>						
Supplemental Annuity Plan	3,999,517,560	83,634,505	(671,400)	4,082,480,665	2.07%	2.09%
Deferred Compensation Plan	959,134,427	22,493,181	(852,044)	980,775,564	2.26%	2.35%
Total All Funds	32,838,391,668	628,019,619	(95,770,052)	33,370,641,235		
Total Non-Participant Directed	26,248,617,719	475,819,883	(106,911,069)	26,617,526,533	1.41%	1.82%
Total Participant Directed	6,589,773,949	152,199,736	11,141,017	6,753,114,702	2.48%	2.31%
Total All Funds	\$ 32,838,391,668	\$ 628,019,619	\$ (95,770,052)	\$ 33,370,641,235	1.62%	1.92%

Notes:

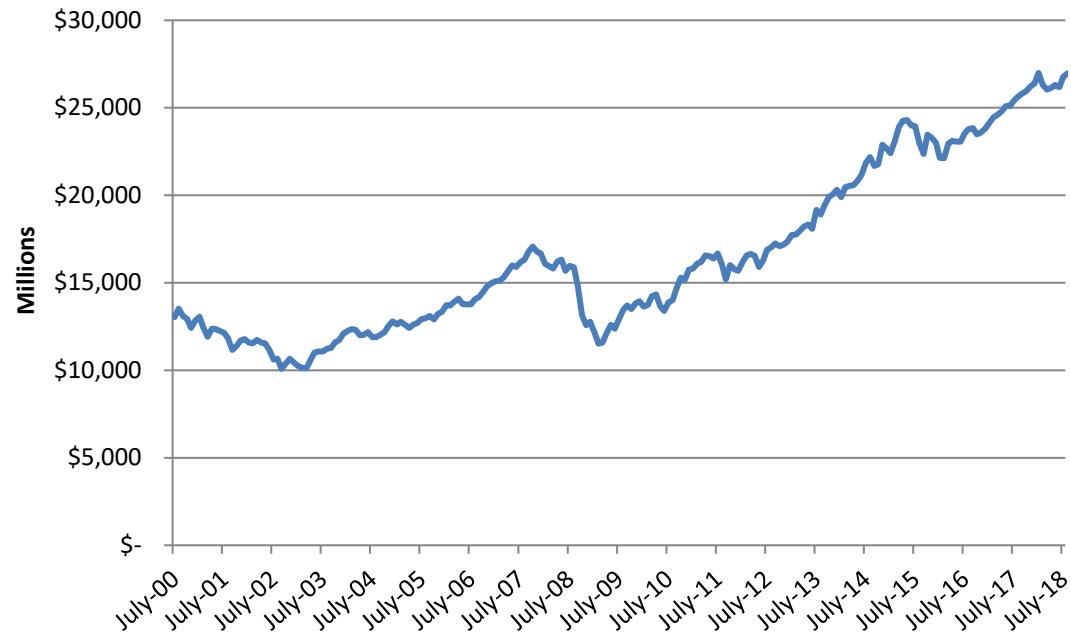
(1) Includes interest, dividends, securities lending, expenses, realized and unrealized gains/losses

(2) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates and can be found at: <http://www.revenue.state.ak.us/treasury/programs/programs/other/armb/investmentresults.aspx>

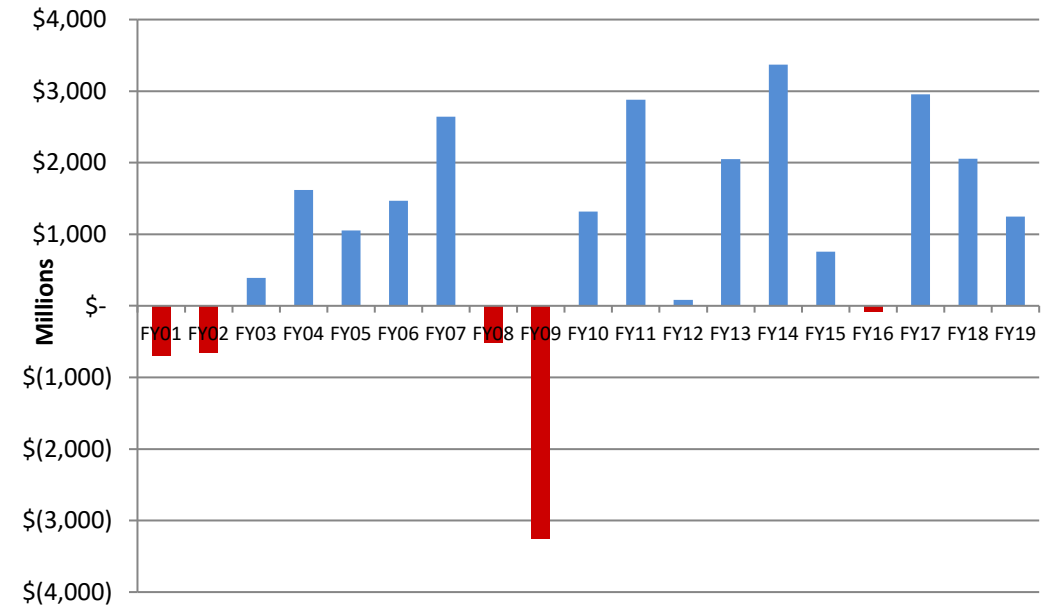
Total Non Participant Directed Assets

As of April 30, 2019

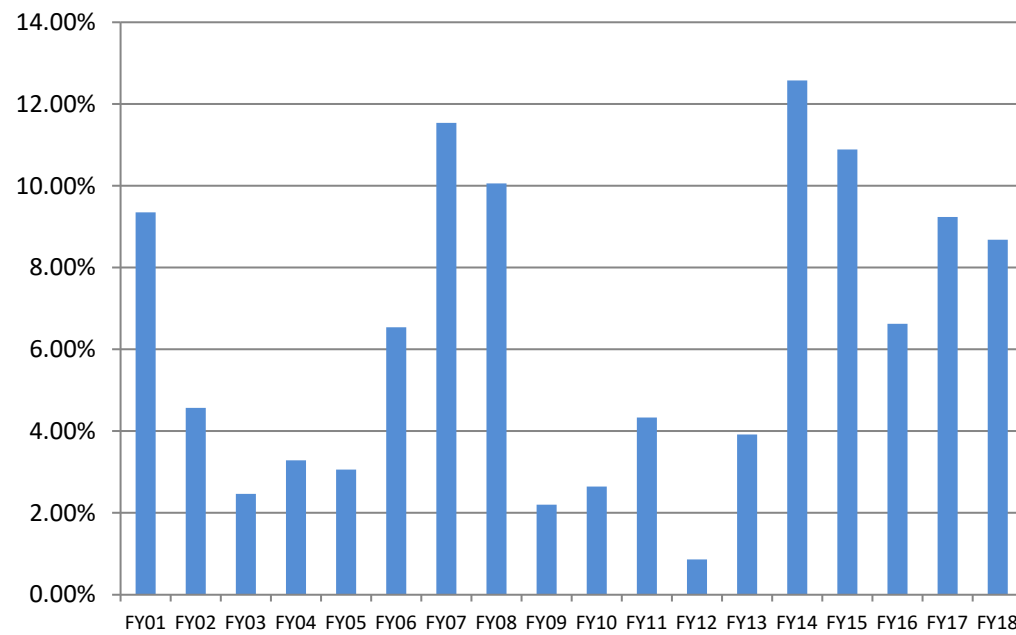
Total Assets History



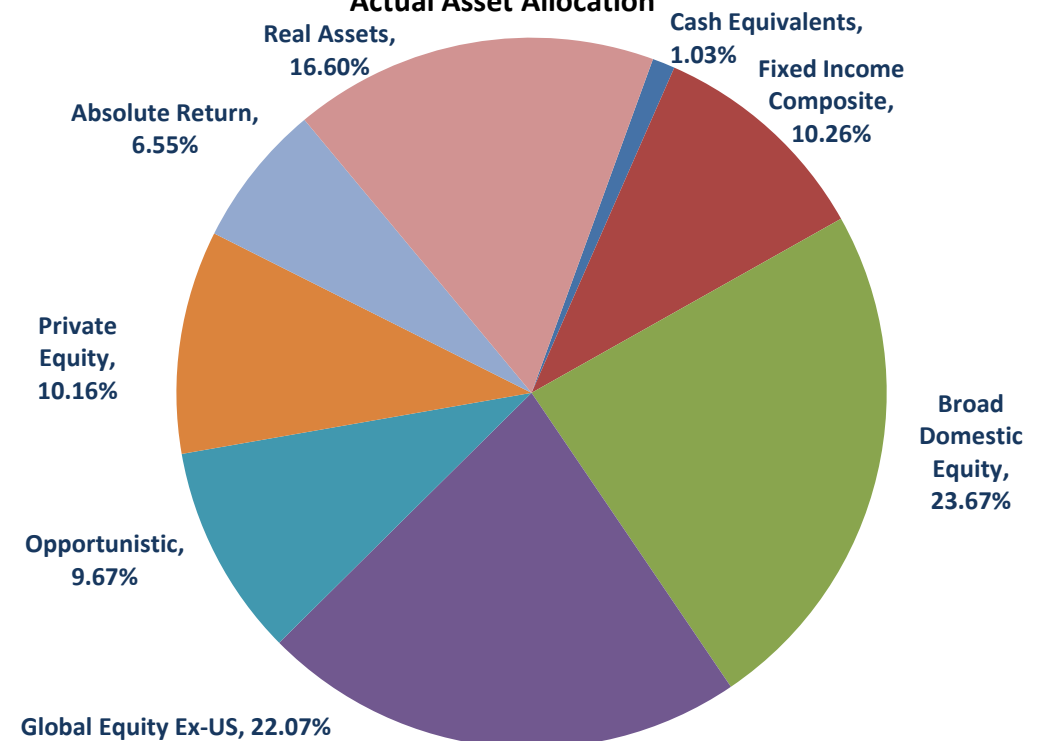
Income by Fiscal Year



5-year Annualized Returns as of Fiscal Year End



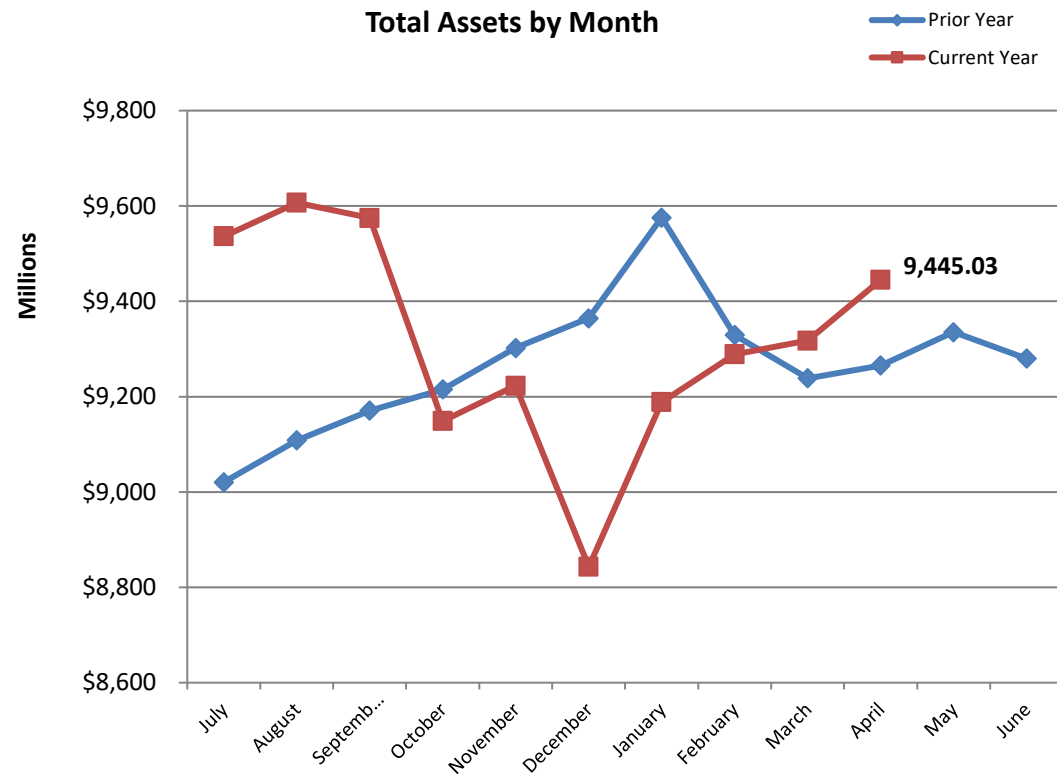
Actual Asset Allocation



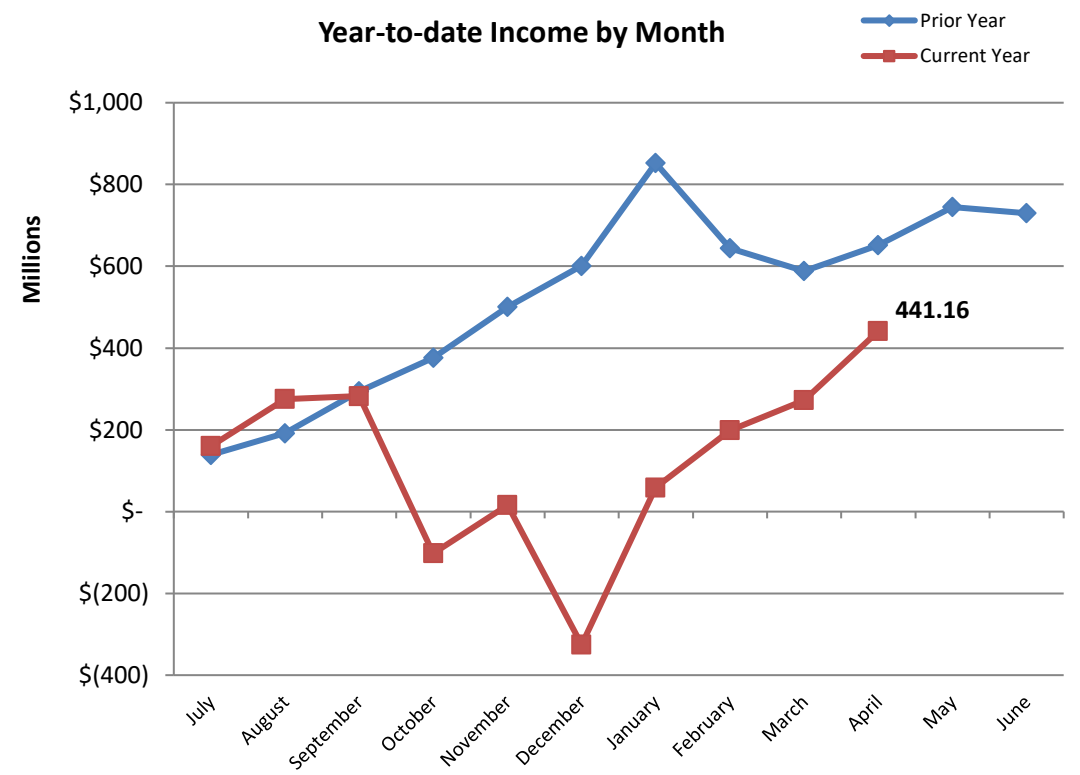
Public Employees' Retirement Pension Trust Fund

Fiscal Year-to-Date through April 30, 2019

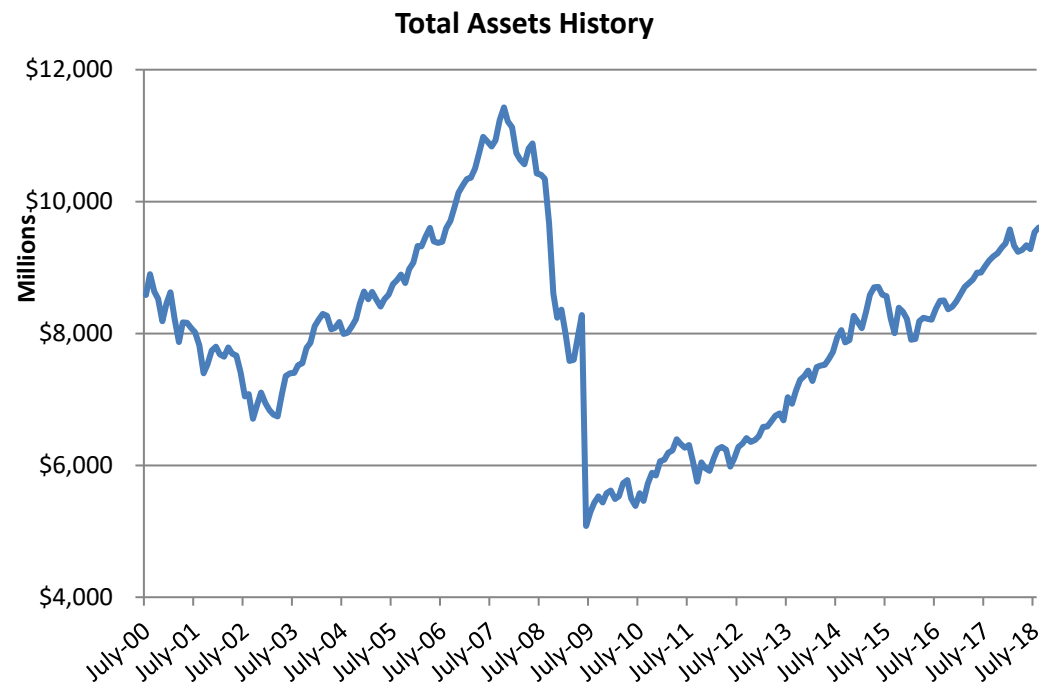
Total Assets by Month



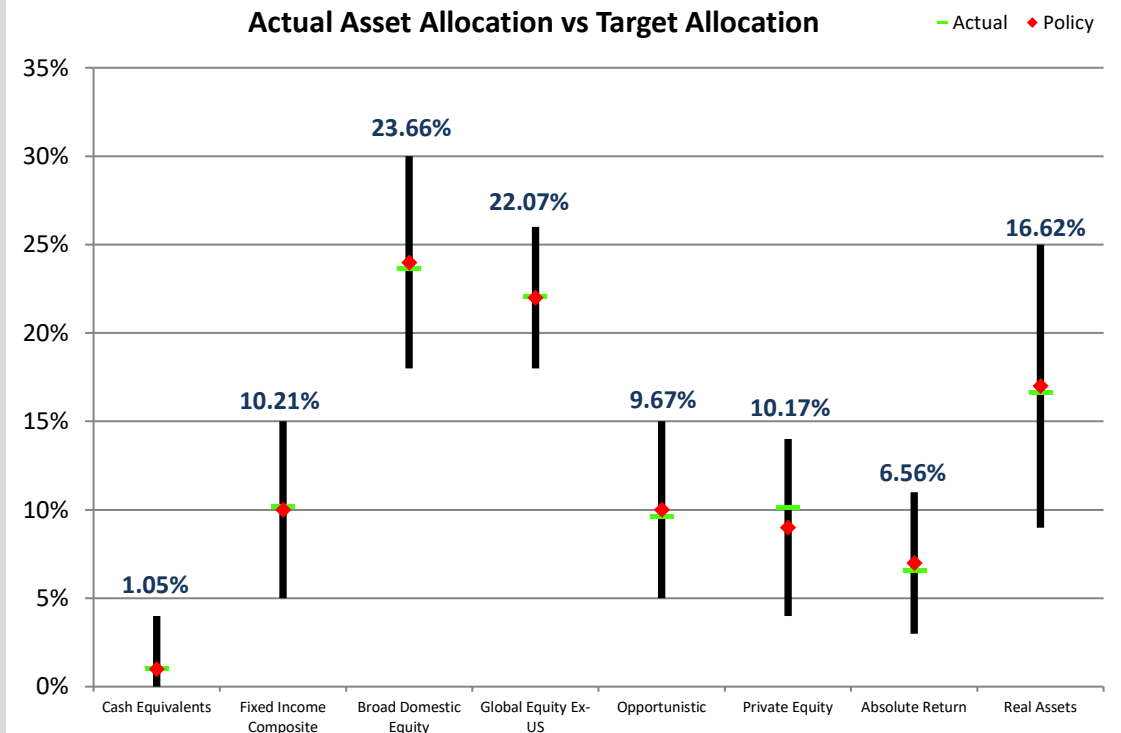
Year-to-date Income by Month



Total Assets History



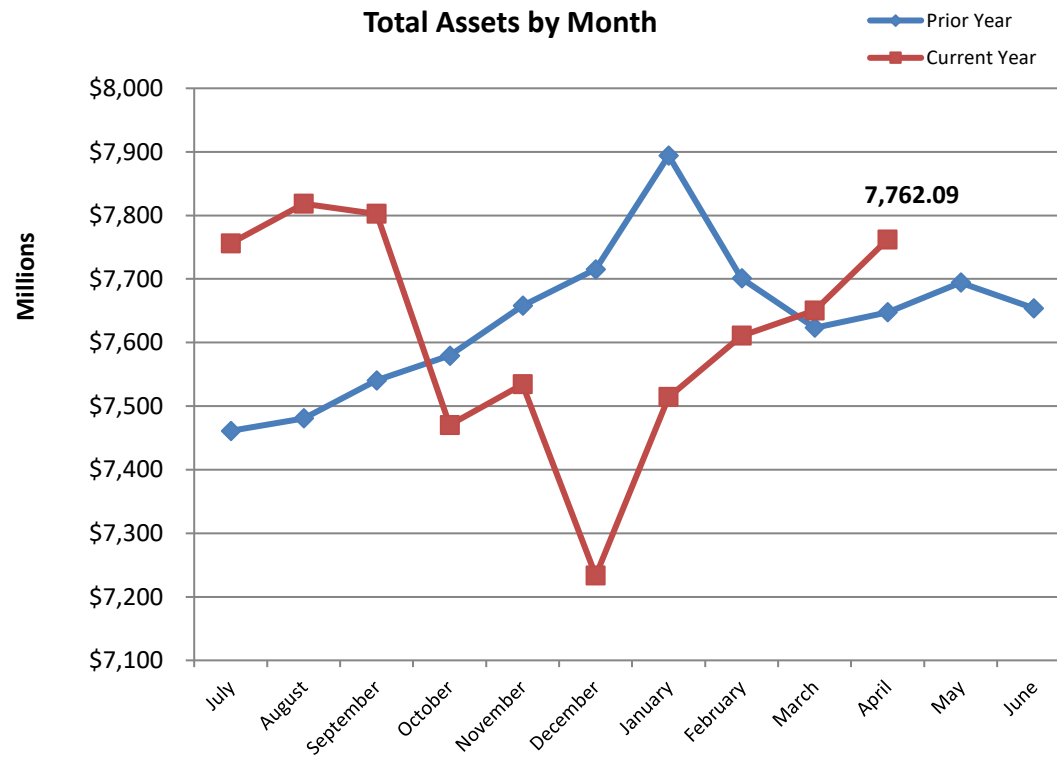
Actual Asset Allocation vs Target Allocation



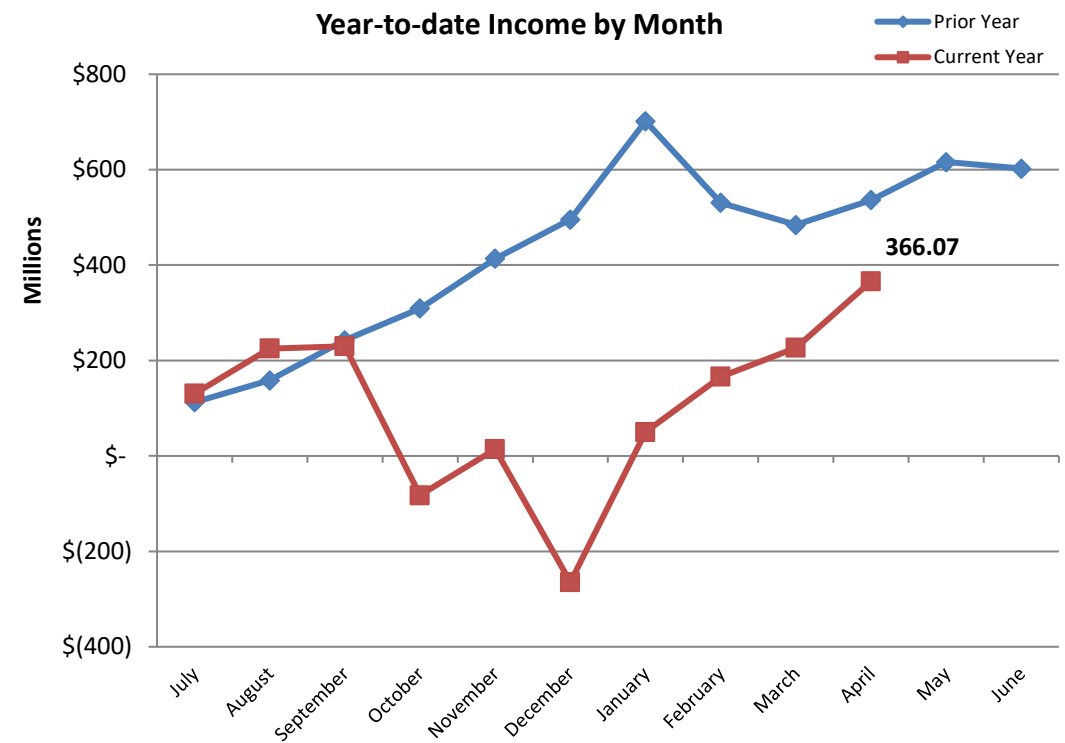
Public Employees' Retirement Health Care Trust Fund

Fiscal Year-to-Date through April 30, 2019

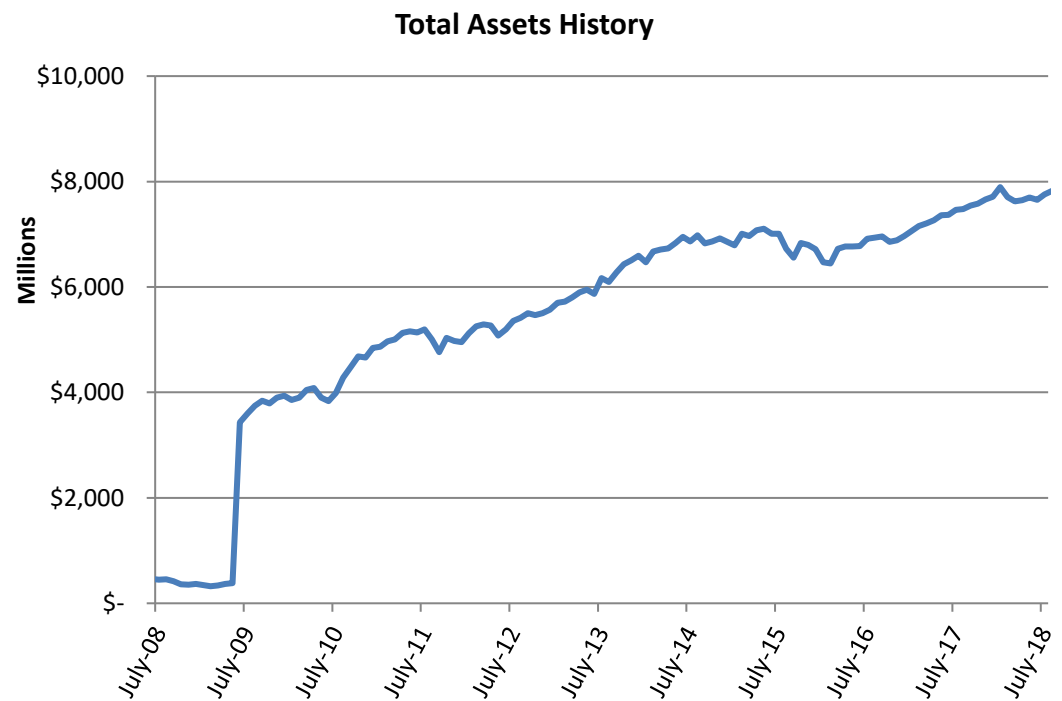
Total Assets by Month



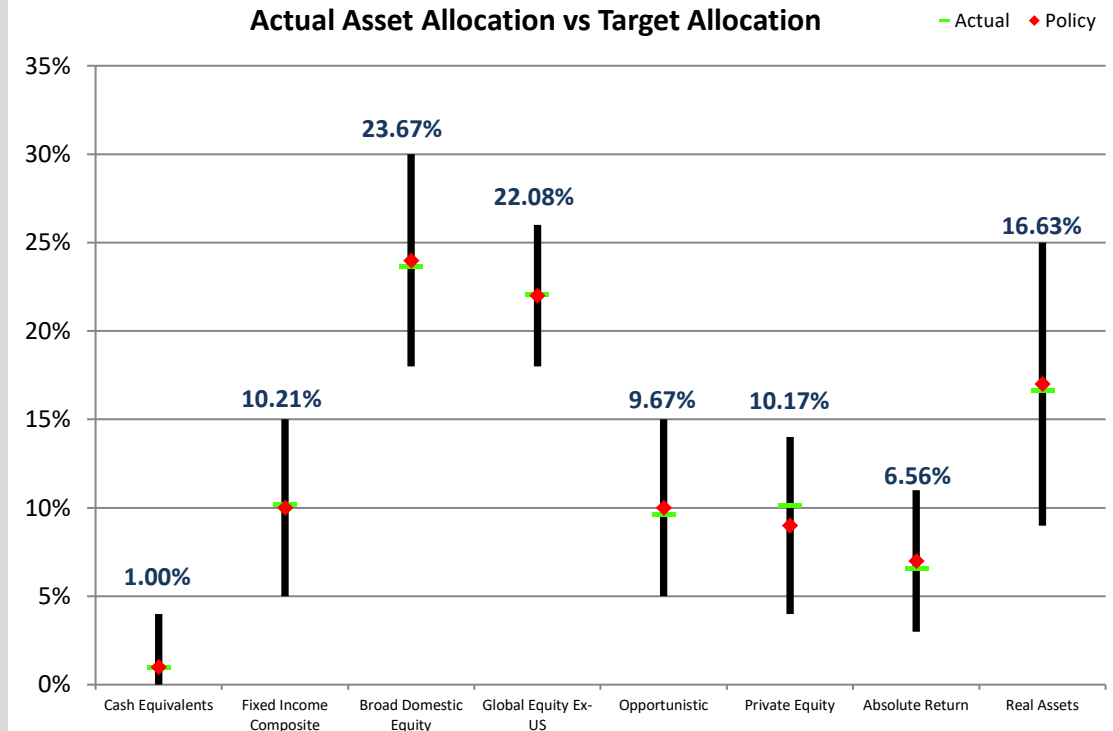
Year-to-date Income by Month



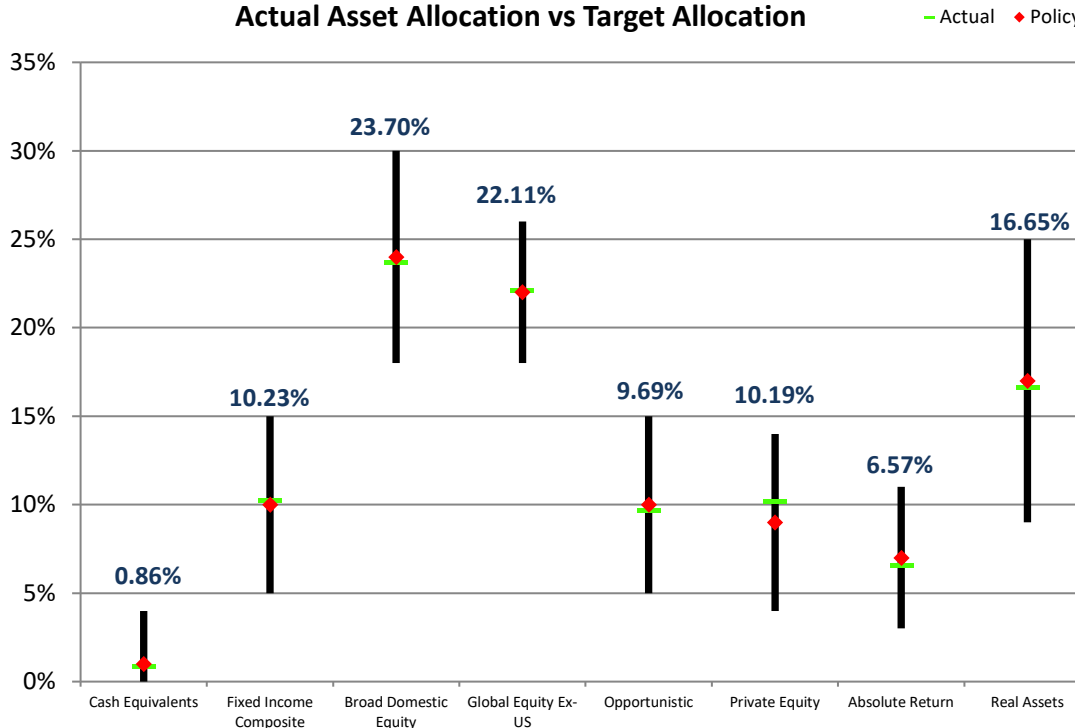
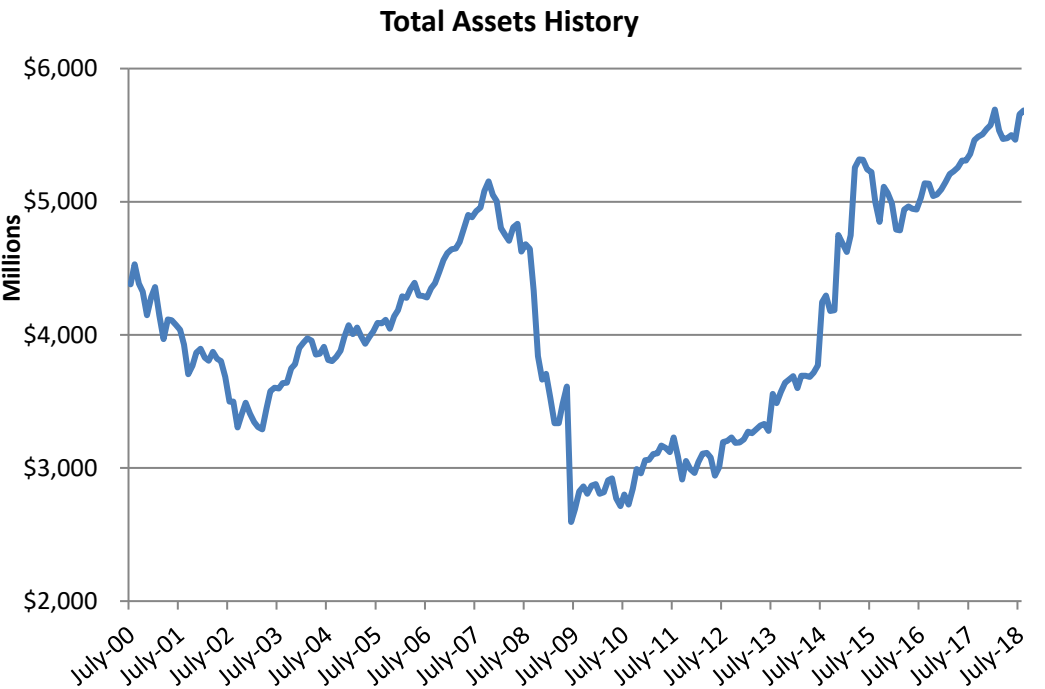
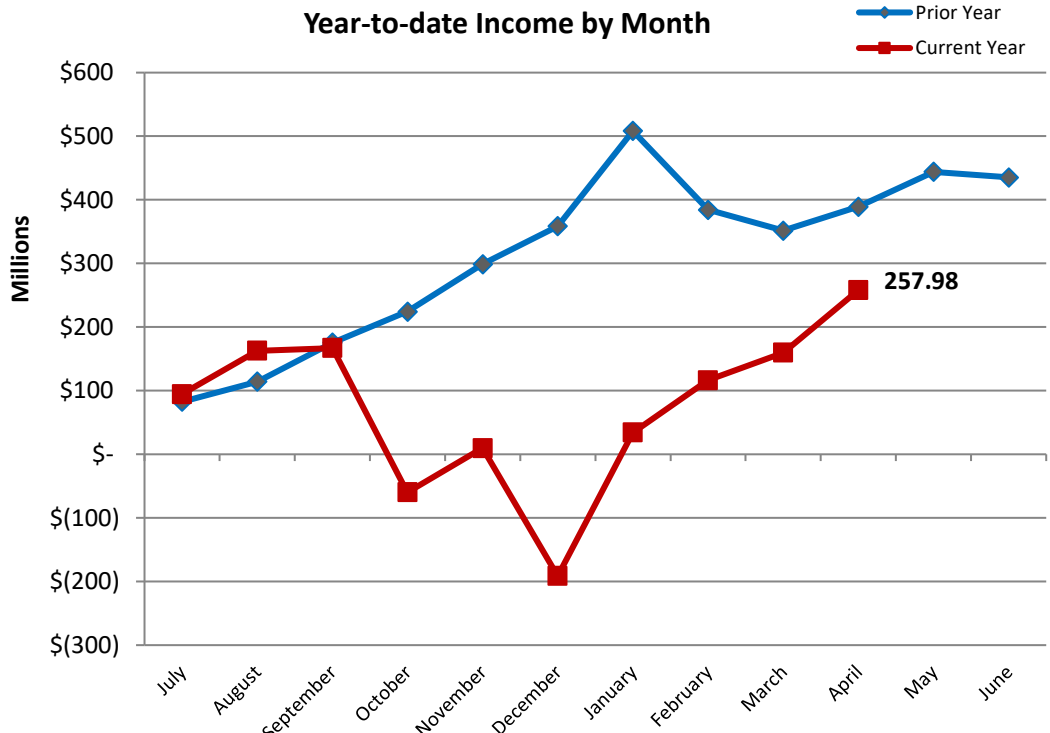
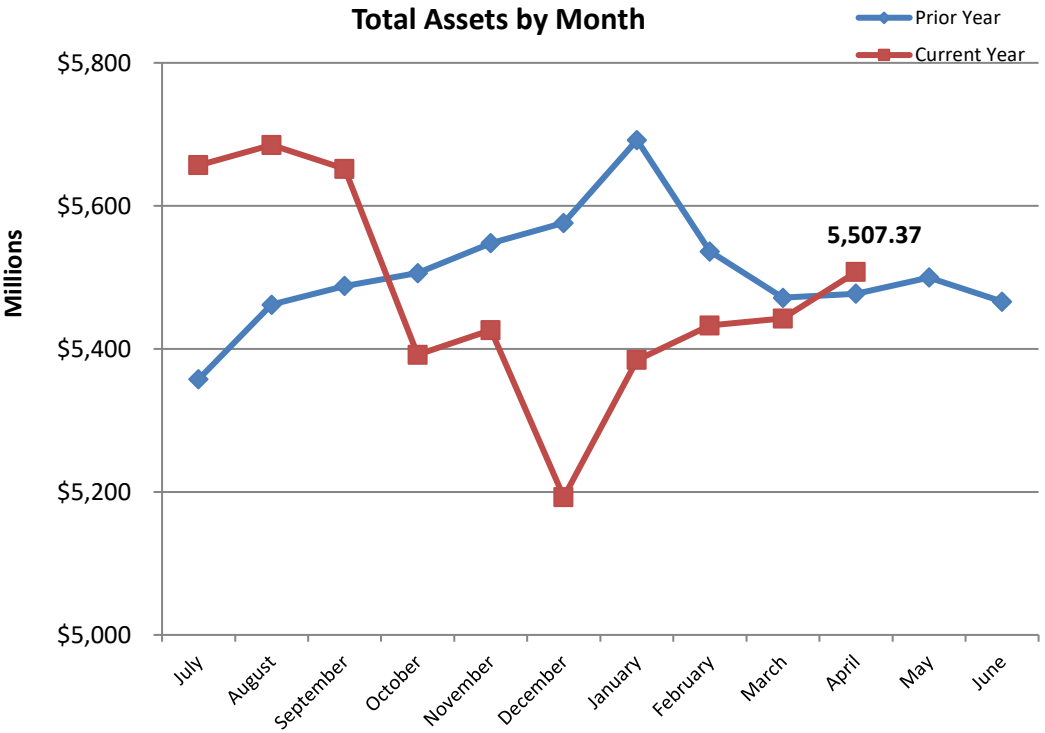
Total Assets History



Actual Asset Allocation vs Target Allocation

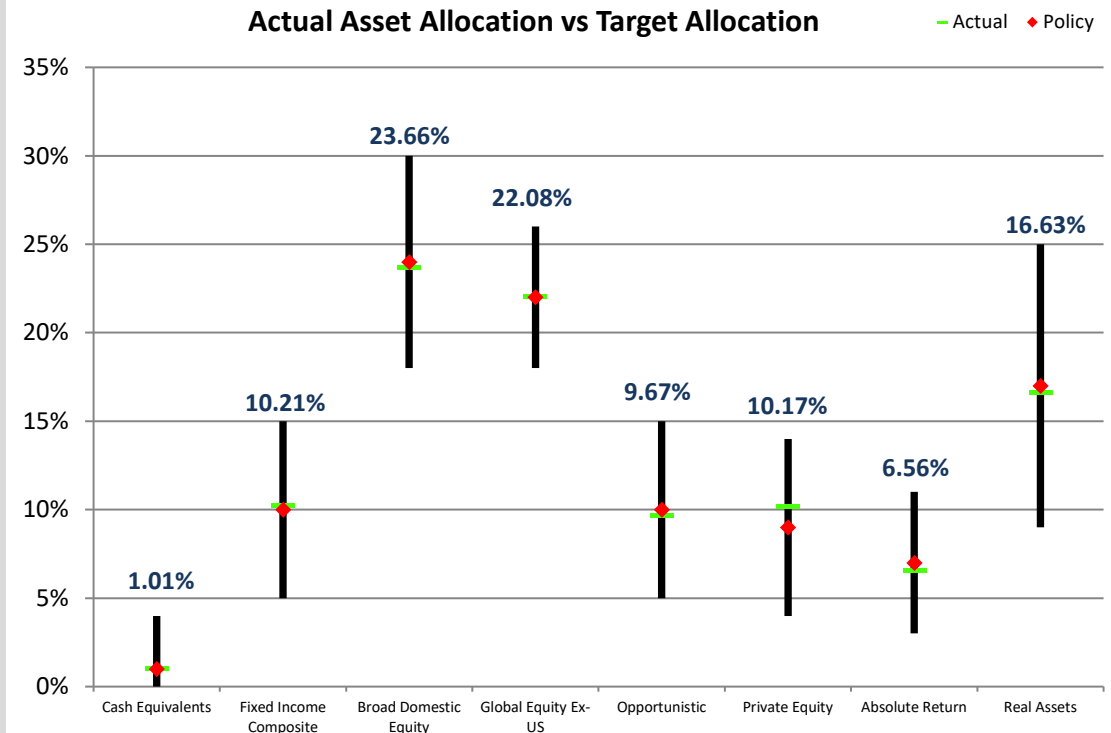
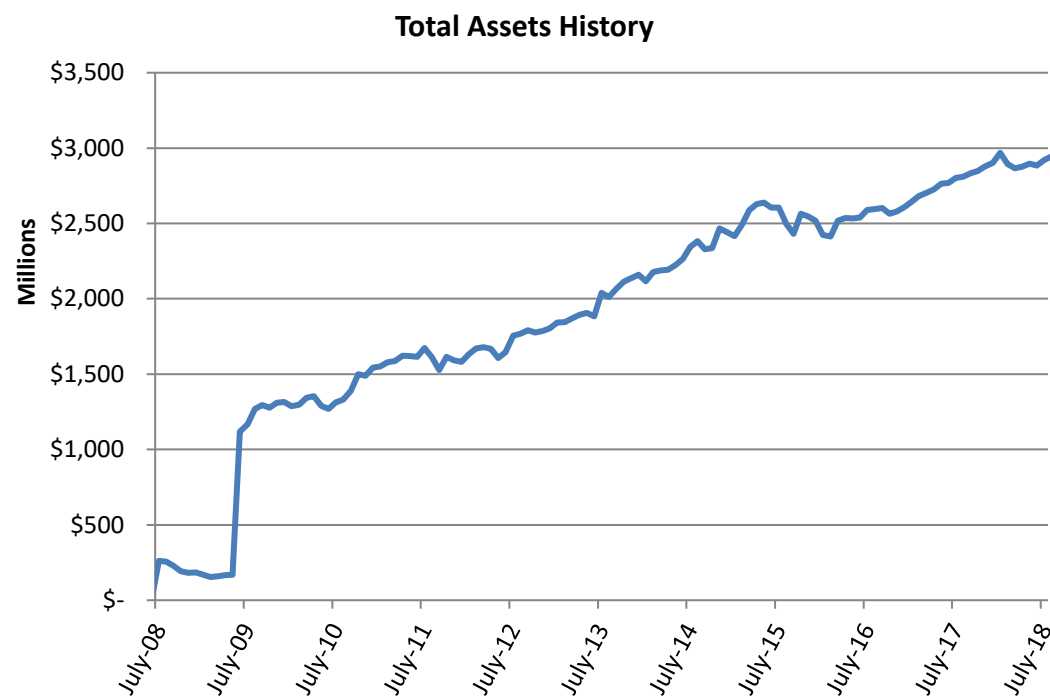
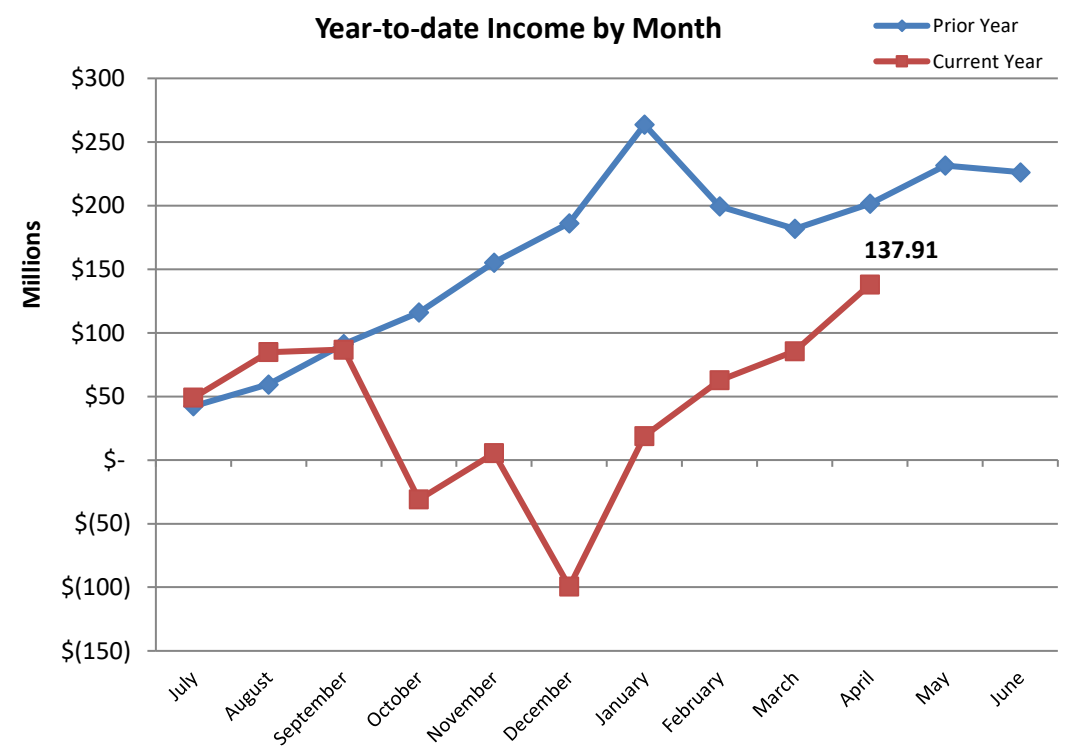
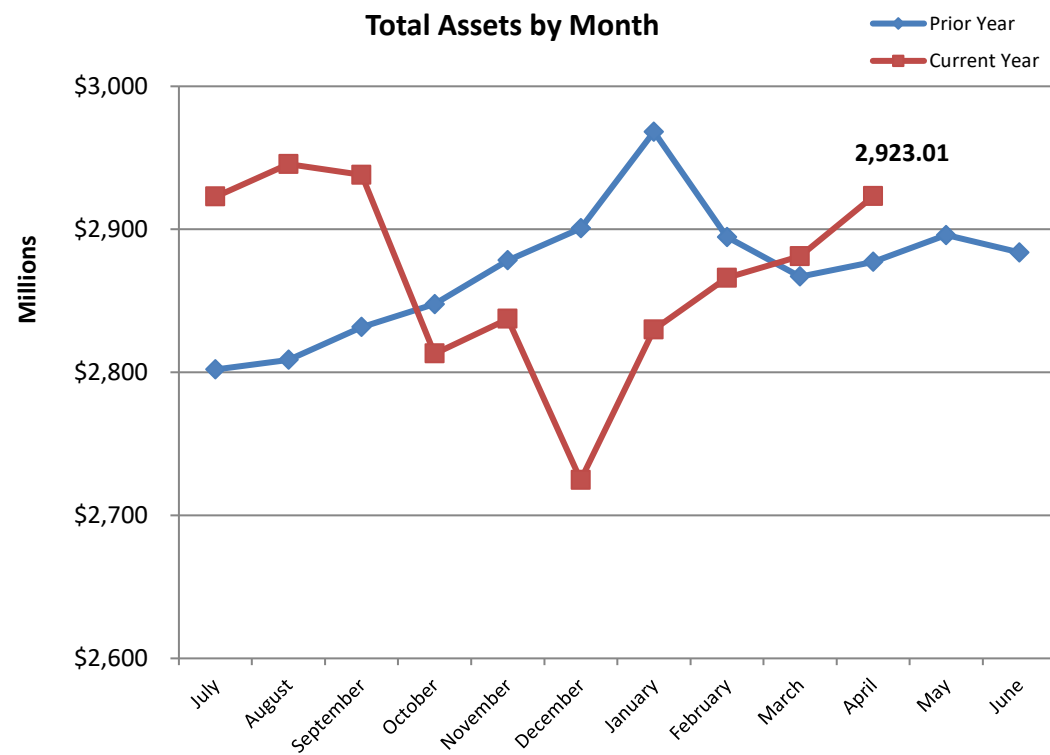


Teachers' Retirement Pension Trust Fund Fiscal Year-to-Date through April 30, 2019



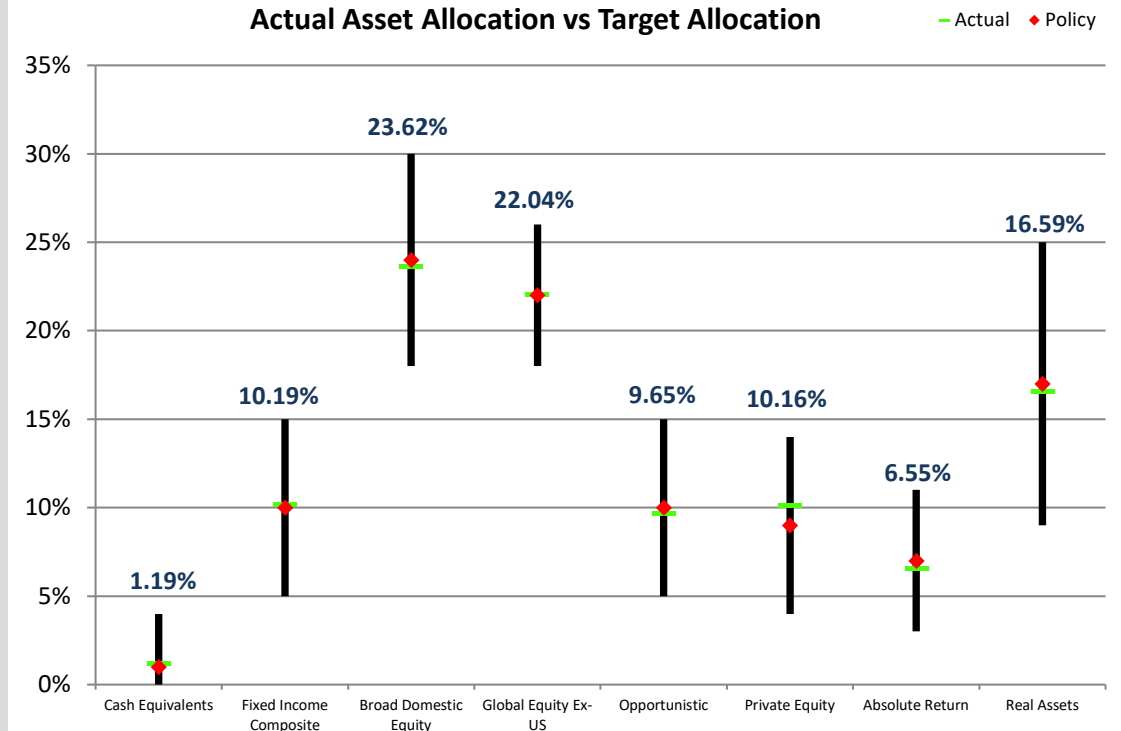
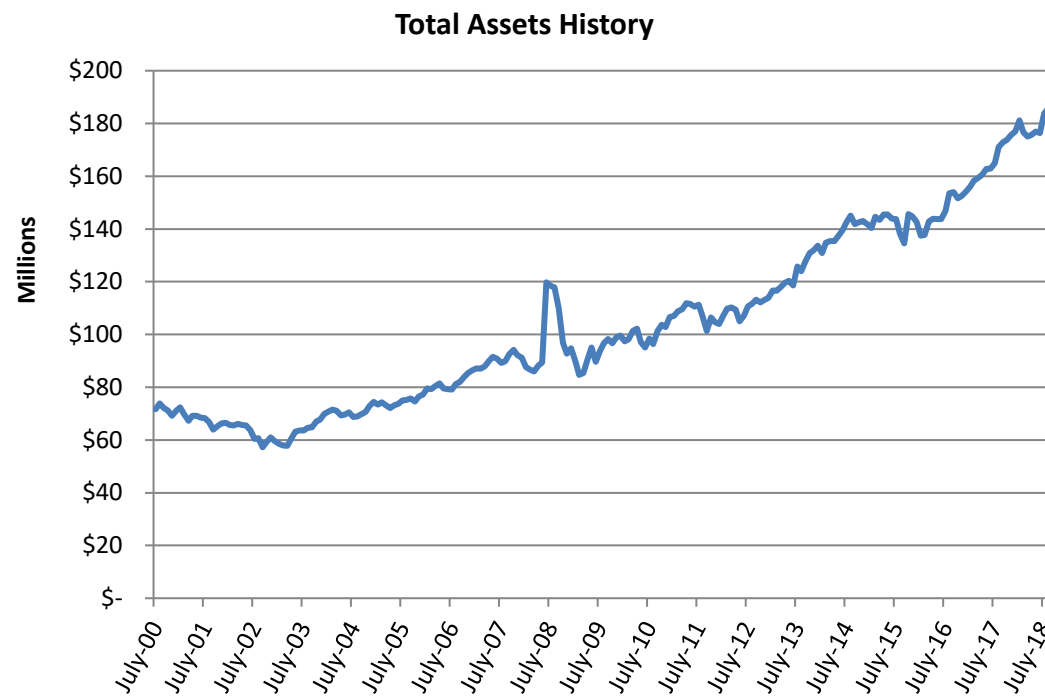
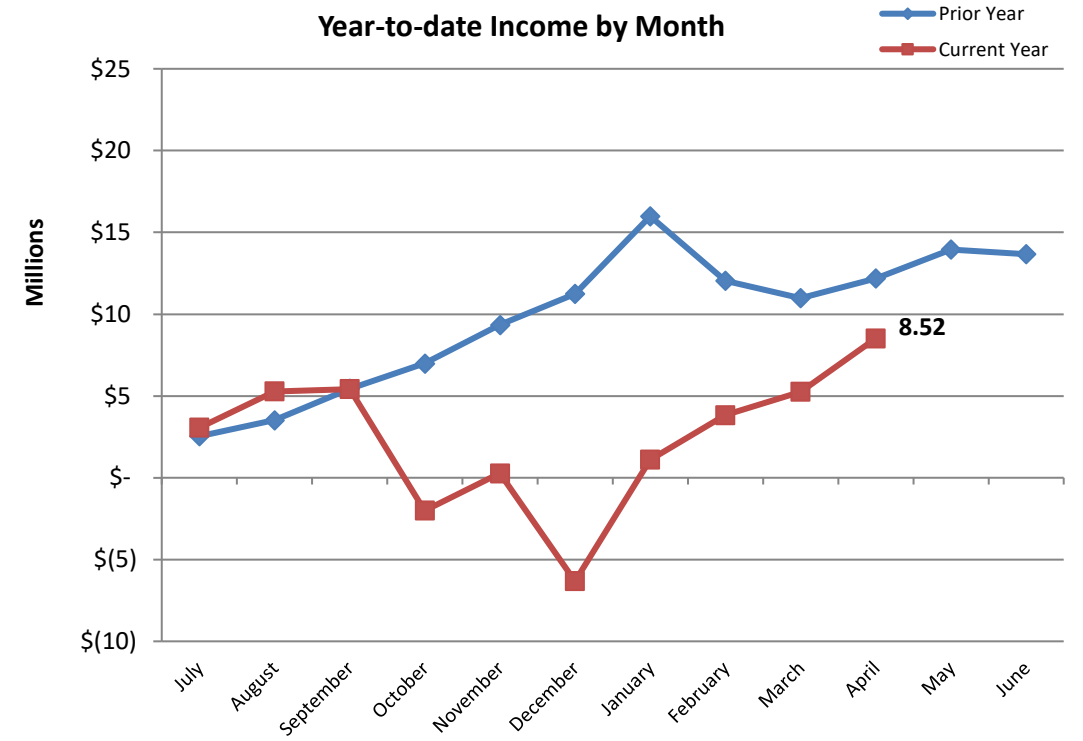
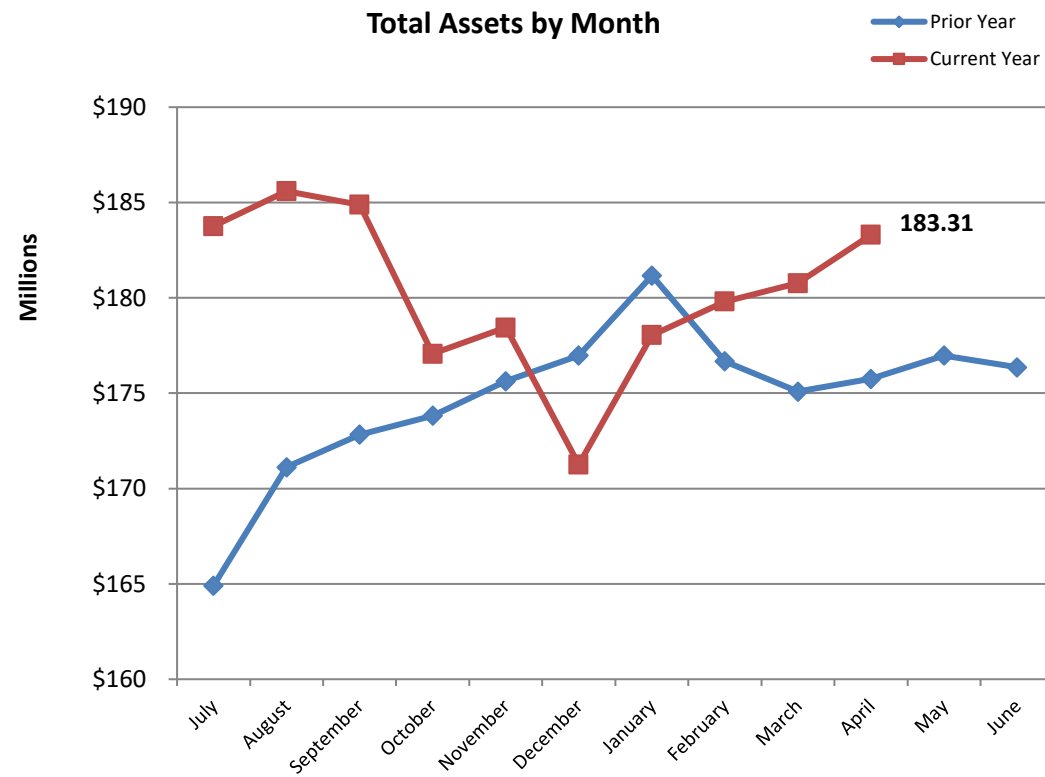
Teachers' Retirement Health Care Trust Fund

Fiscal Year-to-Date through April 30, 2019



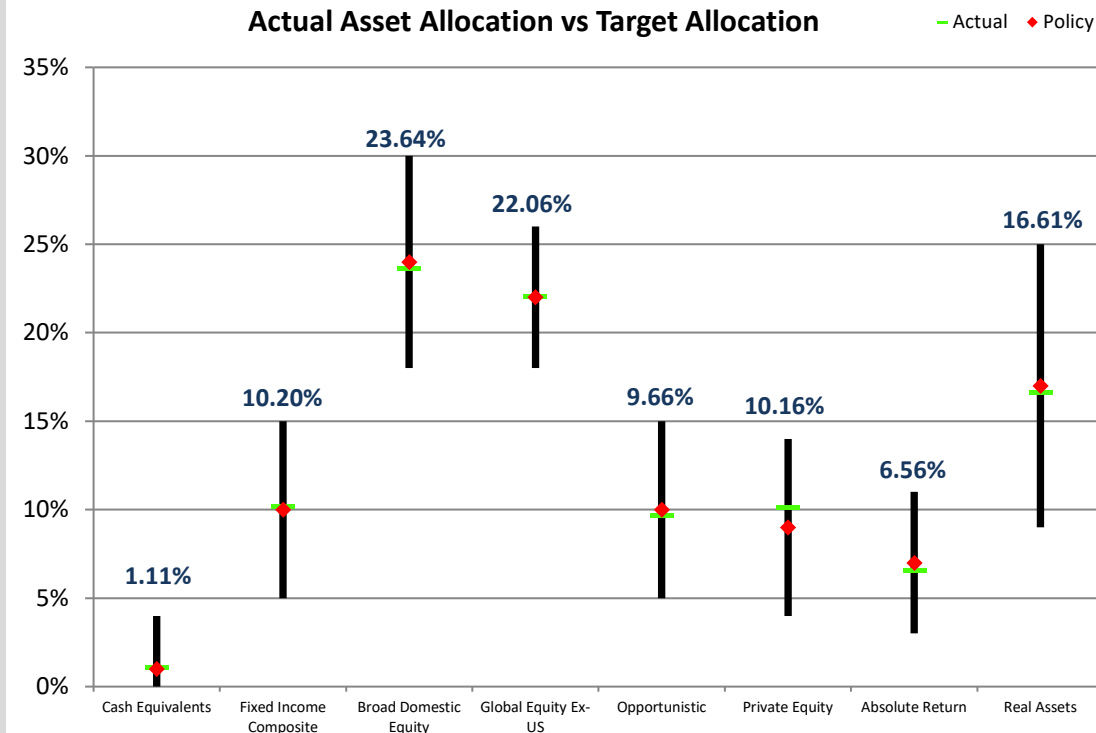
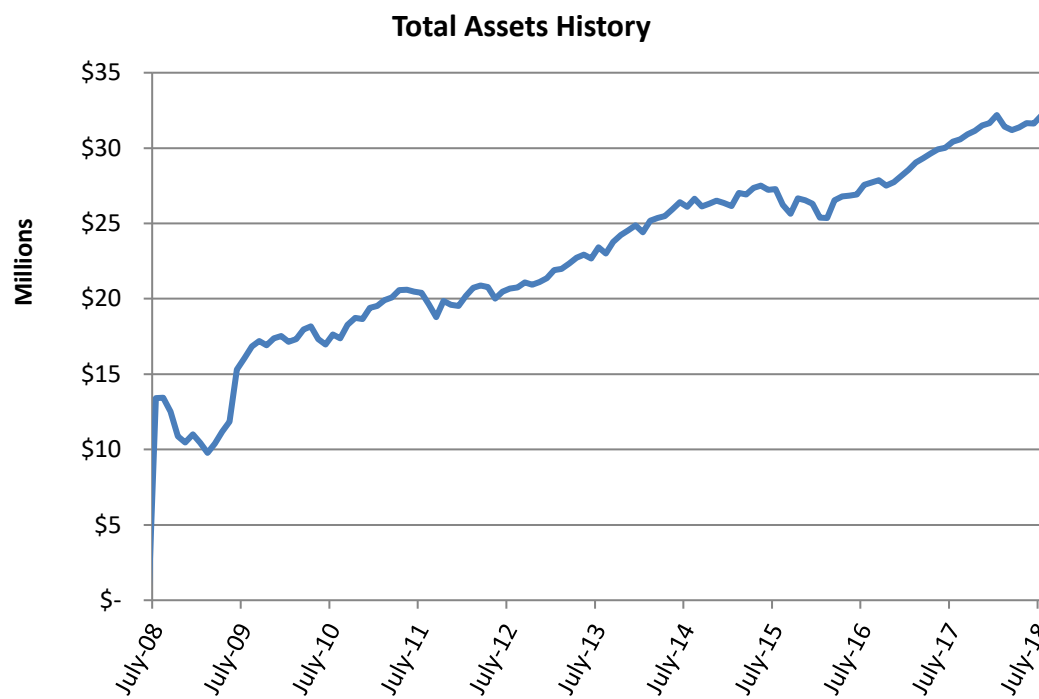
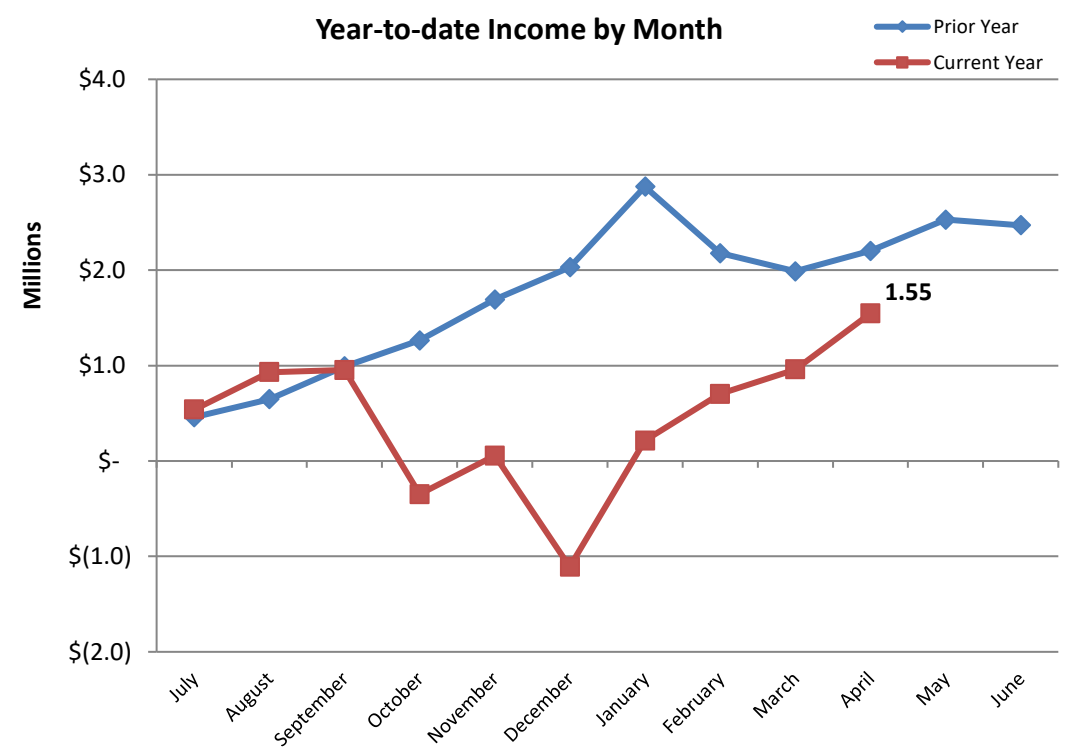
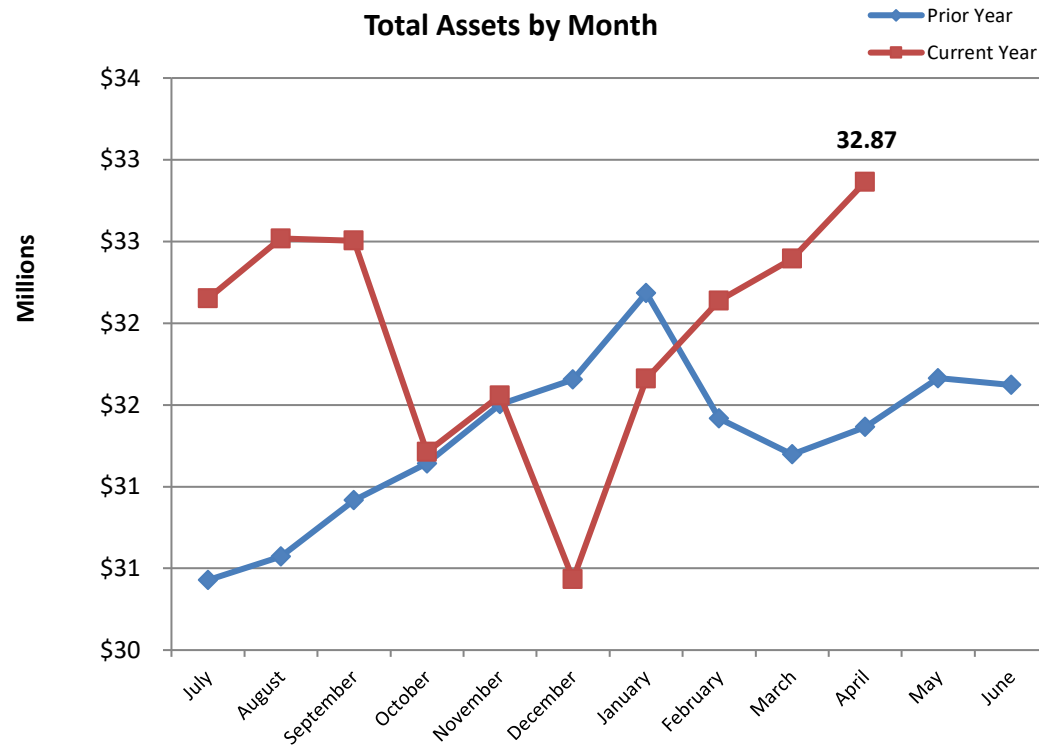
Judicial Retirement Pension Trust Fund

Fiscal Year-to-Date through April 30, 2019



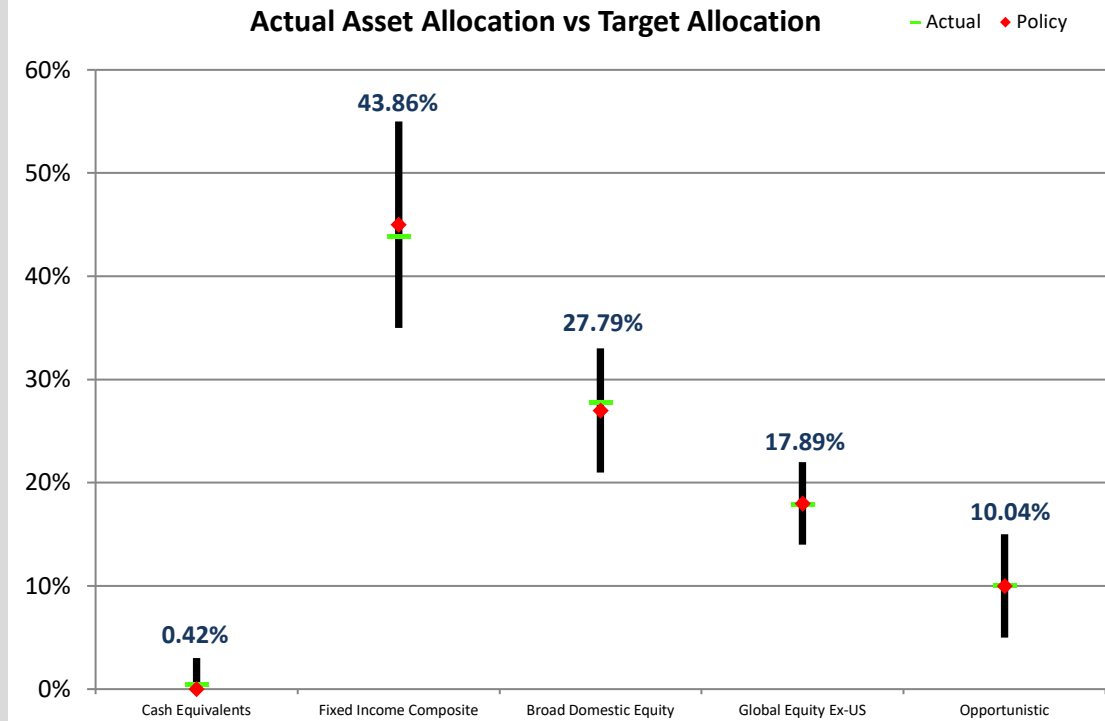
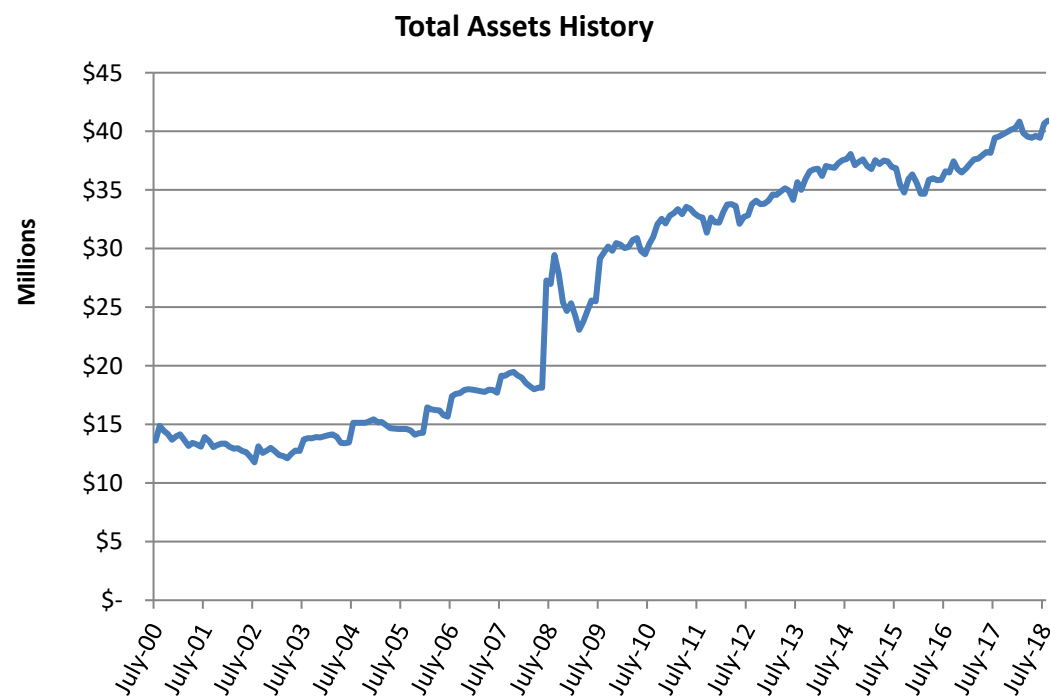
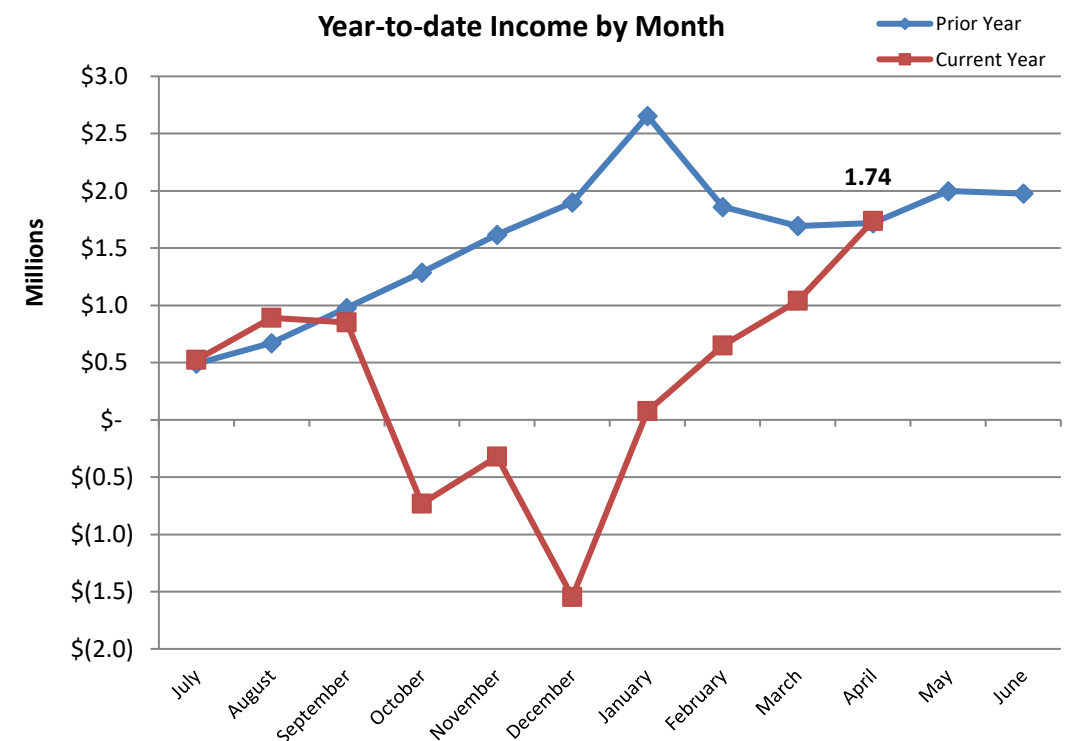
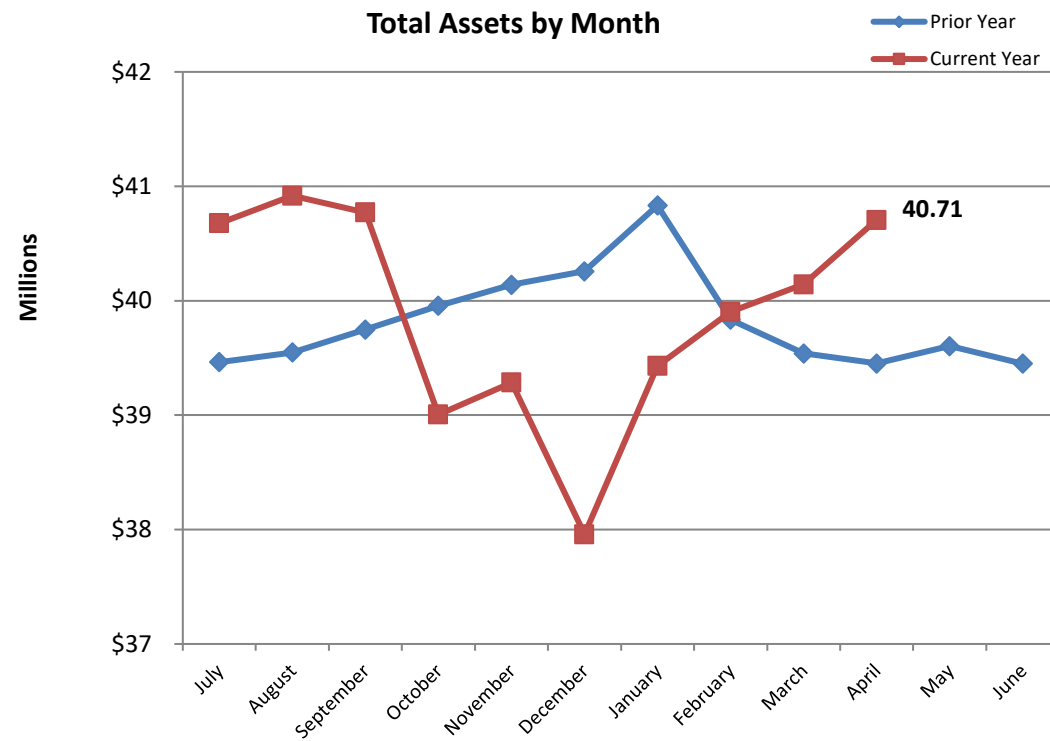
Judicial Retirement Health Care Trust Fund

Fiscal Year-to-Date through April 30, 2019



Military Retirement Trust Fund

Fiscal Year-to-Date through April 30, 2019



ALASKA RETIREMENT MANAGEMENT BOARD

Reporting of Funds by Manager

All Non-Participant Directed Plans

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

	Beginning Invested Assets	Investment Income	Net Contributions and (Withdrawals)	Ending Invested Assets	% increase (decrease)	% Change due to Investment Income
Cash						
Short-Term Fixed Income Pool	\$ 194,319,310	\$ 645,358	\$ 78,686,337	\$ 273,651,005	40.83%	0.28%
Securities Lending Income Pool	102,336	182,123	(188,252)	96,207	-5.99%	2218.31%
Total Cash	<u>194,421,646</u>	<u>827,481</u>	<u>78,498,085</u>	<u>273,747,212</u>	40.80%	0.35%
Fixed Income						
Blackrock US Debt Index Non-Lending Fund	12,810,466	2,758	-	12,813,224	0.02%	0.02%
ARMB US Treasury Fixed Income	2,715,983,542	1,908,993	-	2,717,892,535	0.07%	0.07%
Total Fixed Income	<u>2,728,794,008</u>	<u>1,911,751</u>	<u>-</u>	<u>2,730,705,759</u>	0.07%	0.07%
Domestic Equities						
Small Cap						
Passively Managed						
ARMB S&P 600	151,839,095	5,866,056	1,903	157,707,054	3.86%	3.86%
SSgA Russell 2000 Growth	11,792	126	(6,422)	5,496	-53.39%	1.47%
SSgA Russell 2000 Value	10,195	1,283	(4,150)	7,328	-28.12%	15.80%
Total Passive	<u>151,861,082</u>	<u>5,867,465</u>	<u>(8,669)</u>	<u>157,719,878</u>	3.86%	3.86%
Actively Managed						
ARMB Futures Small Cap	3,895,229	566,038	-	4,461,267	14.53%	14.53%
Arrowmark	53,661,364	354,033	104,136	54,119,533	0.85%	0.66%
BMO Global Asset Management	49,401,661	1,500,958	-	50,902,619	3.04%	3.04%
DePrince, Race & Zollo Inc.- Micro Cap	85,625,514	3,243,090	210,084	89,078,688	4.03%	3.78%
Frontier Capital Mgmt. Co.	95,500,670	5,299,764	196,351	100,996,785	5.76%	5.54%
Jennison Associates, LLC	70,200,459	2,955,697	-	73,156,156	4.21%	4.21%
Lord Abbett & Co.- Micro Cap	89,240,504	2,794,891	-	92,035,395	3.13%	3.13%
T. Rowe Small Cap Growth	48,038,500	1,682,967	-	49,721,467	3.50%	3.50%
Transition Account	(1,520)	1,520	-	-	100.00%	100.00%
Victory Capital Management	121,619,142	6,705,233	-	128,324,375	5.51%	5.51%
Zebra Capital Management	84,242,282	2,552,423	118,968	86,913,673	3.17%	3.03%
Total Active	<u>701,423,805</u>	<u>27,656,614</u>	<u>629,539</u>	<u>729,709,958</u>	4.03%	3.94%
Total Small Cap	<u>853,284,887</u>	<u>33,524,079</u>	<u>620,870</u>	<u>887,429,836</u>	4.00%	3.93%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

Large Cap

Passively Managed

ARMB Russell 1000 Growth	1,660,648,010	70,469,488	(99,995,833)	1,631,121,665	-1.78%	4.38%
ARMB Russell 1000 Value	1,408,412,733	49,668,448	4,167	1,458,085,348	3.53%	3.53%
ARMB Russell Top 200	184,851,557	7,622,812	4,167	192,478,536	4.13%	4.12%
Total Passive	3,253,912,300	127,760,748	(99,987,499)	3,281,685,549	0.85%	3.99%

Actively Managed

Allianz Global Investors	544	(1)	(543)	-	-100.00%	-0.37%
ARMB Equity Yield	388,529,303	12,647,333	-	401,176,636	3.26%	3.26%
ARMB Futures Large Cap	3,626,452	412,499	-	4,038,951	11.37%	11.37%
ARMB Large Cap Multi-Factor	100,812,081	3,885,142	-	104,697,223	3.85%	3.85%
ARMB Portable Alpha	448,676,847	21,687,819	(4,809,720)	465,554,946	3.76%	4.86%
Quantitative Management Assoc.	252	-	(252)	-	-100.00%	-
ARMB S&P 500 Equal Weight	381,786,550	13,729,169	4,516	395,520,235	3.60%	3.60%
ARMB Scientific Beta	386,374,755	12,894,897	51,606	399,321,258	3.35%	3.34%
Barrow, Hanley, Mewhinney & Strauss	7,269	1,002	(8,271)	-	-100.00%	31.98%
Lazard Freres	345,919,792	13,759,263	-	359,679,055	3.98%	3.98%
McKinley Capital Mgmt	25,610	(64)	(25,546)	-	-100.00%	-0.50%
Transition Account	6,416	-	(21)	6,395	-0.33%	-
Total Active	2,055,765,871	79,017,059	(4,788,231)	2,129,994,699	3.61%	3.85%
Total Large Cap	5,309,678,171	206,777,807	(104,775,730)	5,411,680,248	1.92%	3.93%
Total Domestic Equity	6,162,963,058	240,301,886	(104,154,860)	6,299,110,084	2.21%	3.93%

Global Equities Ex US

Small Cap

Mondrian Investment Partners	181,892,245	8,953,975	314,242	191,160,462	5.10%	4.92%
Schroder Investment Management	186,944,221	5,979,106	-	192,923,327	3.20%	3.20%
Total Small Cap	368,836,466	14,933,081	314,242	384,083,789	4.13%	4.05%

Large Cap

Allianz Global Investors	134,644	(202)	(18,448)	115,994	-13.85%	-0.16%
Arrow Street Capital	379,915,769	5,565,501	417,840	385,899,110	1.57%	1.46%
Baillie Gifford Overseas Limited	365,936,847	22,535,465	362,849	388,835,161	6.26%	6.16%
Blackrock ACWI Ex-US IMI	518,071,884	13,682,814	65,365	531,820,063	2.65%	2.64%
Brandes Investment Partners	916,316,731	22,809,757	-	939,126,488	2.49%	2.49%
Cap Guardian Trust Co	577,125,304	19,030,577	-	596,155,881	3.30%	3.30%
Lazard Freres	324,636,920	8,653,265	-	333,290,185	2.67%	2.67%
McKinley Capital Management	340,173,173	5,331,832	400,135	345,905,140	1.69%	1.57%
SSgA MSCI World Ex-US IMI Index Fund	969,975,795	27,249,237	-	997,225,032	2.81%	2.81%
State Street Global Advisors	5,912,034	(13,357)	(2,692,694)	3,205,983	-45.77%	-0.29%
Total Large Cap	4,398,199,101	124,844,889	(1,464,953)	4,521,579,037	2.81%	2.84%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

Emerging Markets Equity

MSCI Emerging Markets Index Fund	323,241,572	6,789,072	-	330,030,644	2.10%	2.10%
DePrince, Race, and Zollo Emerging Markets	283,839,991	7,621,452	-	291,461,443	2.69%	2.69%
Lazard Asset Management	398,181,911	9,296,173	(60,000,000)	347,478,084	-12.73%	2.52%
Total Emerging Markets	<u>1,005,263,474</u>	<u>23,706,697</u>	<u>(60,000,000)</u>	<u>968,970,171</u>	-3.61%	2.43%
Total Global Equities	<u>5,772,299,041</u>	<u>163,484,667</u>	<u>(61,150,711)</u>	<u>5,874,632,997</u>	1.77%	2.85%

Opportunistic

Alternative Equity Strategy

Analytic Buy Write Account	374,091,181	6,131,352	162,433	380,384,966	1.68%	1.64%
ARMB STOXX Minimum Variance	647,920,319	18,470,182	-	666,390,501	2.85%	2.85%
McKinley Global Health Care	249,880,001	(2,527,692)	59,029	247,411,338	-0.99%	-1.01%
Total Alternative Equity Strategy	<u>1,271,891,501</u>	<u>22,073,842</u>	<u>221,462</u>	<u>1,294,186,805</u>	1.75%	1.74%

Opportunistic Fixed Income

Fidelity Inst. Asset Mgmt. High Yield CMBS	107,584,911	1,292,498	-	108,877,409	1.20%	1.20%
Fidelity Institutional Asset Management	213,668,597	1,751,185	173,651	215,593,433	0.90%	0.82%
Lazard Emerging Income	69,183,103	(178,934)	-	69,004,169	-0.26%	-0.26%
MacKay Shields, LLC	51,706,926	627,598	-	52,334,524	1.21%	1.21%
Mondrian Investment Partners	102,320,339	(84,894)	96,696	102,332,141	0.01%	-0.08%
Western Asset Management	60,555,307	(110,345)	-	60,444,962	-0.18%	-0.18%
Total Opportunistic Fixed Income	<u>605,019,183</u>	<u>3,297,108</u>	<u>270,347</u>	<u>608,586,638</u>	0.59%	0.54%

Other Opportunities

Project Pearl	9,704,312	-	400,000	10,104,312	4.12%	-
Schroders Insurance Linked Securities	233,044,141	(143,616)	-	232,900,525	-0.06%	-0.06%
Total Other Opportunities	<u>242,748,453</u>	<u>(143,616)</u>	<u>400,000</u>	<u>243,004,837</u>	0.11%	-0.06%

Tactical Allocation Strategies

Eaton Vance High Yield	22,747	-	-	22,747	-	-
Fidelity Signals	211,286,852	4,609,780	-	215,896,632	2.18%	2.18%
PineBridge	207,123,671	5,045,002	74,350	212,243,023	2.47%	2.44%
Total Tactical Allocation Strategies	<u>418,433,270</u>	<u>9,654,782</u>	<u>74,350</u>	<u>428,162,402</u>	2.33%	2.31%
Total Opportunistic	<u>2,538,092,407</u>	<u>34,882,116</u>	<u>966,159</u>	<u>2,573,940,682</u>	1.41%	1.37%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

Private Equity

Abbott Capital	1,030,165,378	11,054,378	3,015,543	1,044,235,299	1.37%	1.07%
Advent International GPE Fund VIII-B	21,817,567	-	-	21,817,567	-	-
Angelo, Gordon & Co.	3,757	-	-	3,757	-	-
Dyal Capital Partners III	26,756,176	(13,399)	1,384,088	28,126,865	5.12%	-0.05%
Dyal Capital Partners IV	1,472,249	(1)	(745)	1,471,503	-0.05%	0.00%
Glendon Opportunities	39,179,149	-	-	39,179,149	-	-
KKR Lending Partners II	35,448,671	-	-	35,448,671	-	-
Lexington Capital Partners VIII	39,250,044	-	(265,259)	38,984,785	-0.68%	-
Lexington Partners VII	21,893,766	-	(504,602)	21,389,164	-2.30%	-
Merit Capital Partners	13,745,234	294,898	(124,339)	13,915,793	1.24%	2.16%
NB SOF III	29,143,591	-	-	29,143,591	-	-
NB SOF IV	12,604,314	-	-	12,604,314	-	-
New Mountain Partners IV	24,254,805	-	61,251	24,316,056	0.25%	-
New Mountain Partners V	17,446,812	-	-	17,446,812	-	-
NGP XI	47,785,357	-	-	47,785,357	-	-
NGP XII	12,158,367	-	149,589	12,307,956	1.23%	-
Onex Partnership III	9,080,018	-	-	9,080,018	-	-
Pathway Capital Management LLC	1,161,773,100	448,830	(6,254,830)	1,155,967,100	-0.50%	0.04%
Resolute Fund III	19,823,400	1,108,093	(33,904)	20,897,589	5.42%	5.59%
Resolute Fund IV	5,508,769	394,870	2,793,044	8,696,683	57.87%	5.72%
Summit Partners GE IX	28,732,391	-	-	28,732,391	-	-
Warburg Pincus Global Growth Fund	480,000	-	-	480,000	-	-
Warburg Pincus X	11,001,902	-	(232,140)	10,769,762	-2.11%	-
Warburg Pincus XI	28,040,041	-	(660,000)	27,380,041	-2.35%	-
Warburg Pincus XII	51,975,472	-	1,235,000	53,210,472	2.38%	-
Total Private Equity	2,689,540,330	13,287,669	562,696	2,703,390,695	0.51%	0.49%

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

Absolute Return

Allianz Global Investors	245,673,023	3,663,559	-	249,336,582	1.49%	1.49%
Crestline Investors, Inc.	508,816,819	1,214,109	2,997,000	513,027,928	0.83%	0.24%
Crestline Specialty Fund	30,495,105	-	(2,573,528)	27,921,577	-8.44%	-
Crestline Specialty Lending Fund II	31,496,121	-	(11,381,734)	20,114,387	-36.14%	-
JPM Systemic Alpha	178,020,615	(2,523,291)	-	175,497,324	-1.42%	-1.42%
Man Group Alternative Risk Premia	209,791,614	(36,869)	-	209,754,745	-0.02%	-0.02%
Prisma Capital Partners	424,104,035	12,997,825	-	437,101,860	3.06%	3.06%
Zebra Global Equity Advantage Fund	39,446,356	(1,065,640)	-	38,380,716	-2.70%	-2.70%
Zebra Global Equity Fund	77,913,023	(1,060,866)	-	76,852,157	-1.36%	-1.36%
Total Absolute Return Investments	<u>1,745,756,711</u>	<u>13,188,827</u>	<u>(14,641,422)</u>	<u>1,744,304,116</u>	-0.08%	0.76%

Real Assets

Farmland

Hancock Agricultural Investment Group	277,586,407	-	-	277,586,407	-	-
UBS Agrivest, LLC	582,692,953	-	-	582,692,953	-	-
Total Farmland	<u>860,279,360</u>	<u>-</u>	<u>-</u>	<u>860,279,360</u>	<u>-</u>	<u>-</u>

Timber

Hancock Natural Resource Group	95,685,180	-	-	95,685,180	-	-
Timberland Invt Resource LLC	267,275,894	(1,705,011)	-	265,570,883	-0.64%	-0.64%
Total Timber	<u>362,961,074</u>	<u>(1,705,011)</u>	<u>-</u>	<u>361,256,063</u>	<u>-0.47%</u>	<u>-0.47%</u>

Energy

EIG Energy Fund XIV-A	11,217,867	(466,527)	-	10,751,340	-4.16%	-4.16%
EIG Energy Fund XV	24,370,331	(190,062)	(84,650)	24,095,619	-1.13%	-0.78%
EIG Energy Fund XVI	56,150,666	101,188	-	56,251,854	0.18%	0.18%
Total Energy	<u>91,738,864</u>	<u>(555,401)</u>	<u>(84,650)</u>	<u>91,098,813</u>	<u>-0.70%</u>	<u>-0.61%</u>

REIT

REIT Transition Account	-	-	-	-	-	-
ARMB REIT	224,084,795	(146,277)	35,018,550	258,957,068	15.56%	-0.06%
Total REIT	<u>224,084,795</u>	<u>(146,277)</u>	<u>35,018,550</u>	<u>258,957,068</u>	<u>15.56%</u>	<u>-0.06%</u>

Master Limited Partnerships

Advisory Research MLP	307,029,574	(4,981,352)	(17,147,559)	284,900,663	-7.21%	-1.67%
Tortoise Capital Advisors	318,093,082	(4,984,964)	(17,021,452)	296,086,666	-6.92%	-1.61%
Total Master Limited Partnerships	<u>625,122,656</u>	<u>(9,966,316)</u>	<u>(34,169,011)</u>	<u>580,987,329</u>	<u>-7.06%</u>	<u>-1.64%</u>

Alaska Retirement Management Board
All Non-Participant Directed Plans by Manager
Schedule of Investment Income and Changes in Invested Assets
For the Month Ended April 30, 2019

Infrastructure Private

IFM Global Infrastructure Fund-Private	437,406,679	12,498,950	-	449,905,629	2.86%	2.86%
JP Morgan Infrastructure Fund-Private	119,067,316	-	-	119,067,316	-	-
Total Infrastructure Private	<u>556,473,995</u>	<u>12,498,950</u>	<u>-</u>	<u>568,972,945</u>	<u>2.25%</u>	<u>2.25%</u>

Infrastructure Public

Brookfield Investment Mgmt.-Public	82,912,739	377,111	-	83,289,850	0.45%	0.45%
Lazard Asset Mgmt.-Public	79,734,630	1,690,889	-	81,425,519	2.12%	2.12%
Total Infrastructure Public	<u>162,647,369</u>	<u>2,068,000</u>	<u>-</u>	<u>164,715,369</u>	<u>1.27%</u>	<u>1.27%</u>

Real Estate

Core Commingled Accounts						
JP Morgan	260,992,657	(305,870)	(1,829,552)	258,857,235	-0.82%	-0.12%
UBS Trumbull Property Fund	72,189,628	348,701	(4,683,742)	67,854,587	-6.01%	0.50%
Total Core Commingled	<u>333,182,285</u>	<u>42,831</u>	<u>(6,513,294)</u>	<u>326,711,822</u>	<u>-1.94%</u>	<u>0.01%</u>
Core Separate Accounts						
LaSalle Investment Management	172,261,669	-	(566,224)	171,695,445	-0.33%	-
Sentinel Separate Account	170,191,709	-	(726,484)	169,465,225	-0.43%	-
UBS Realty	521,215,391	-	(737,410)	520,477,981	-0.14%	-
Total Core Separate	<u>863,668,769</u>	<u>-</u>	<u>(2,030,118)</u>	<u>861,638,651</u>	<u>-0.24%</u>	<u>-</u>
Non-Core Commingled Accounts						
Almanac Realty Securities V	1,068,483	(3,398)	-	1,065,085	-0.32%	-0.32%
Almanac Realty Securities VII	36,892,423	725,422	(260,590)	37,357,255	1.26%	1.97%
Almanac Realty Securities VIII	652,031	(163,505)	966,443	1,454,969	123.14%	-14.40%
BlackRock US Core Property Fund	207,670,425	5,596,309	-	213,266,734	2.69%	2.69%
Clarion Ventures 4	30,083,177	-	-	30,083,177	-	-
Colony Investors VIII, L.P.	1,507,931	-	-	1,507,931	-	-
Coventry	255,803	-	-	255,803	-	-
ING Clarion Development Ventures III	2,365,907	-	-	2,365,907	-	-
KKR Real Estate Partners Americas II	7,759,138	-	-	7,759,138	-	-
KKR Real Estate Partners Americas L.P.	19,049,516	-	81,654	19,131,170	0.43%	-
Silverpeak Legacy Pension Partners II, L.P.	3,617,951	(254,957)	-	3,362,994	-7.05%	-7.05%
Silverpeak Legacy Pension Partners III, L.P.	4,472,944	(201,161)	-	4,271,783	-4.50%	-4.50%
Tishman Speyer Real Estate Venture VI	20,381,644	-	-	20,381,644	-	-
Tishman Speyer Real Estate Venture VII	813,978	-	-	813,978	-	-
Total Non-Core Commingled	<u>336,591,351</u>	<u>5,698,710</u>	<u>787,507</u>	<u>343,077,568</u>	<u>1.93%</u>	<u>1.69%</u>
Total Real Estate	<u>1,533,442,405</u>	<u>5,741,541</u>	<u>(7,755,905)</u>	<u>1,531,428,041</u>	<u>-0.13%</u>	<u>0.38%</u>
Total Real Assets	<u>4,416,750,518</u>	<u>7,935,486</u>	<u>(6,991,016)</u>	<u>4,417,694,988</u>	<u>0.02%</u>	<u>0.18%</u>
Total Assets	<u>\$ 26,248,617,719</u>	<u>\$ 475,819,883</u>	<u>\$ (106,911,069)</u>	<u>\$ 26,617,526,533</u>	<u>1.41%</u>	<u>1.82%</u>

ALASKA RETIREMENT MANAGEMENT BOARD

Reporting of Funds by Manager

Participant Directed Plans

Supplemental Annuity Plan
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
April 30, 2019

	<u>Beginning Invested</u>		<u>Net Contributions</u>		<u>Ending Invested</u>	<u>% Change in</u>	<u>% Change due</u>
	<u>Assets</u>	<u>Investment Income</u>	<u>(Withdrawals)</u>	<u>Transfers In (Out)</u>	<u>Assets</u>	<u>Invested</u>	<u>to Investment</u>
Participant Options						<u>Assets</u>	<u>Income (1)</u>
T. Rowe Price							
Stable Value Fund	\$ 381,980,435	\$ 788,923	\$ (1,530,924)	\$ 5,629,245	\$ 386,867,679	1.28%	0.21%
Small Cap Stock Fund	183,642,325	5,907,149	25,868	(525,461)	189,049,881	2.94%	3.22%
Alaska Balanced Trust	1,132,536,838	15,052,871	(4,441,930)	(4,151,760)	1,138,996,019	0.57%	1.33%
Long Term Balanced Fund	676,633,052	15,095,572	416,083	(3,580,883)	688,563,824	1.76%	2.24%
AK Target Date 2010 Trust	10,382,323	164,169	(154,263)	(2,596)	10,389,633	0.07%	1.59%
AK Target Date 2015 Trust	82,616,505	1,519,214	(148,877)	(647,859)	83,338,983	0.87%	1.85%
AK Target Date 2020 Trust	96,274,430	2,114,211	(259,244)	887,363	99,016,760	2.85%	2.19%
AK Target Date 2025 Trust	80,943,526	2,013,163	408,543	375,016	83,740,248	3.46%	2.48%
AK Target Date 2030 Trust	61,870,767	1,712,831	514,537	(670,525)	63,427,610	2.52%	2.77%
AK Target Date 2035 Trust	58,373,814	1,757,538	613,994	(46,011)	60,699,335	3.98%	3.00%
AK Target Date 2040 Trust	57,759,586	1,851,558	722,606	345,621	60,679,371	5.06%	3.18%
AK Target Date 2045 Trust	66,653,291	2,216,162	460,666	231,251	69,561,370	4.36%	3.31%
AK Target Date 2050 Trust	74,003,229	2,465,642	1,112,440	372,838	77,954,149	5.34%	3.30%
AK Target Date 2055 Trust	65,016,465	2,165,172	1,597,651	(399,516)	68,379,772	5.17%	3.30%
AK Target Date 2060 Trust	4,708,014	155,181	24,454	(354,109)	4,533,540	-3.71%	3.42%
Total Investments with T. Rowe Price	<u>3,033,394,600</u>	<u>54,979,356</u>	<u>(638,396)</u>	<u>(2,537,386)</u>	<u>3,085,198,174</u>		
State Street Global Advisors							
Money Market	48,500,641	92,120	(69,384)	(1,002,981)	47,520,396	-2.02%	0.19%
S&P 500 Stock Index Fund Series A	469,717,257	18,989,787	(257,333)	(5,921,150)	482,528,561	2.73%	4.07%
Russell 3000 Index	74,299,276	2,988,382	223,903	261,110	77,772,671	4.67%	4.01%
US Real Estate Investment Trust Index	38,846,673	(81,088)	64,610	206,389	39,036,584	0.49%	-0.21%
World Equity Ex-US Index	62,856,816	1,704,455	104,269	2,100,322	66,765,862	6.22%	2.66%
US Treasury Inflation Protected Securities Index	45,150,101	142,630	(209,447)	58,397	45,141,681	-0.02%	0.32%
Total Investments with SSgA	<u>739,370,764</u>	<u>23,836,286</u>	<u>(143,382)</u>	<u>(4,297,913)</u>	<u>758,765,755</u>		
BlackRock							
Passive U.S. Bond Index Fund	110,632,917	32,547	84,270	3,760,300	114,510,034	3.50%	0.03%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	62,633,402	2,754,900	(15,743)	(241,164)	65,131,395	3.99%	4.41%
Northern Trust							
Environmental, Social, and Governance Fund	53,485,877	2,031,416	41,851	3,316,163	58,875,307	10.08%	3.68%
Total All Funds	<u>\$ 3,999,517,560</u>	<u>\$ 83,634,505</u>	<u>\$ (671,400)</u>	<u>\$ -</u>	<u>\$ 4,082,480,665</u>	2.07%	2.09%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Supplemental Annuity Plan
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
April 30, 2019
\$ (Thousands)

<u>Invested Assets (at fair value)</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>
Investments with T. Rowe Price										
Stable Value Fund	\$ 355,917	\$ 363,879	\$ 369,544	\$ 373,441	\$ 374,495	\$ 382,274	\$ 378,203	\$ 378,341	\$ 381,980	\$ 386,868
Small Cap Stock Fund	181,818	192,895	189,729	172,923	177,009	156,442	175,255	187,422	183,642	189,050
Alaska Balanced Trust	1,149,694	1,155,054	1,144,920	1,104,106	1,108,918	1,082,282	1,111,444	1,122,299	1,132,537	1,138,996
Long Term Balanced Fund	690,744	693,992	690,403	654,861	660,551	630,635	660,581	670,607	676,633	688,564
AK Target Date 2010 Trust	10,224	10,332	10,477	10,540	10,537	10,210	10,233	10,386	10,382	10,390
AK Target Date 2015 Trust	85,669	85,913	85,682	81,246	82,044	78,566	81,457	82,759	82,617	83,339
AK Target Date 2020 Trust	95,933	97,261	97,663	93,194	93,831	89,514	94,098	95,362	96,274	99,017
AK Target Date 2025 Trust	77,962	79,810	79,145	75,437	76,556	72,746	77,110	80,033	80,944	83,740
AK Target Date 2030 Trust	58,998	60,191	60,272	57,512	58,699	55,234	58,909	60,359	61,871	63,428
AK Target Date 2035 Trust	54,648	56,123	56,190	53,521	54,177	51,406	55,417	57,262	58,374	60,699
AK Target Date 2040 Trust	54,939	56,321	56,549	53,608	54,348	51,036	54,952	56,894	57,760	60,679
AK Target Date 2045 Trust	62,116	63,775	64,636	60,954	62,184	58,011	63,281	65,226	66,653	69,561
AK Target Date 2050 Trust	71,313	72,734	73,411	69,234	70,566	65,679	71,083	73,088	74,003	77,954
AK Target Date 2055 Trust	58,693	60,532	61,791	58,774	59,913	56,286	60,928	63,289	65,016	68,380
AK Target Date 2060 Trust	3,459	4,069	4,121	4,345	4,957	4,559	5,043	5,072	4,708	4,534
State Street Global Advisors										
Money Market	42,005	40,850	43,080	46,118	46,268	49,692	48,781	48,142	48,501	47,520
S&P 500 Stock Index Fund Series A	469,954	484,173	488,706	461,005	470,784	425,162	458,896	463,844	469,717	482,529
Russell 3000 Index	76,432	78,281	77,681	72,900	74,021	65,142	71,269	73,578	74,299	77,773
US Real Estate Investment Trust Index	35,067	36,342	35,138	34,078	36,532	33,048	37,173	37,648	38,847	39,037
World Equity Ex-US Index	55,690	55,661	58,202	54,600	55,447	54,910	59,333	61,278	62,857	66,766
Long US Treasury Bond Index	12,732	-	-	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	33,228	36,218	38,180	39,322	40,096	41,051	42,112	42,239	45,150	45,142
World Government Bond Ex-US Index	12,569	-	-	-	-	-	-	-	-	-
Investments with BlackRock										
Passive U.S. Bond Index Fund	-	111,572	107,003	100,001	100,208	101,791	103,842	106,897	110,633	114,510
Government/Credit Bond Fund	49,922	-	-	-	-	-	-	-	-	-
Intermediate Bond Fund	41,183	-	-	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford										
AK International Equity Fund	69,890	68,052	68,018	61,819	61,571	58,080	62,562	63,284	62,633	65,131
Investments with Northern Trust										
Environmental, Social, and Governance Fund	54,712	53,437	53,544	49,257	51,252	45,119	47,282	50,572	53,486	58,875
Total Invested Assets	\$ 3,965,512	\$ 4,017,465	\$ 4,014,083	\$ 3,842,792	\$ 3,884,963	\$ 3,718,875	\$ 3,889,244	\$ 3,955,881	\$ 3,999,518	\$ 4,082,481
<u>Change in Invested Assets</u>										
Beginning Assets	\$ 3,905,659	\$ 3,965,512	\$ 4,017,465	\$ 4,014,083	\$ 3,842,792	\$ 3,884,963	\$ 3,718,875	\$ 3,889,244	\$ 3,955,881	\$ 3,999,518
Investment Earnings	64,770	58,603	(2,073)	(171,828)	46,202	(159,774)	180,878	72,089	46,415	83,635
Net Contributions (Withdrawals)	(4,918)	(6,650)	(1,309)	537	(4,031)	(6,315)	(10,510)	(5,452)	(2,778)	(671)
Ending Invested Assets	\$ 3,965,512	\$ 4,017,465	\$ 4,014,083	\$ 3,842,792	\$ 3,884,963	\$ 3,718,875	\$ 3,889,244	\$ 3,955,881	\$ 3,999,518	\$ 4,082,481

Deferred Compensation Plan
Schedule of Invested Assets and Changes in Invested Assets
for the Month Ended
April 30, 2019

	<u>Beginning Invested</u> <u>Assets</u>	<u>Investment Income</u>	<u>Net Contributions</u> <u>(Withdrawals)</u>	<u>Transfers In (Out)</u>	<u>Ending Invested</u> <u>Assets</u>	<u>% Change in</u> <u>Invested</u> <u>Assets</u>	<u>% Change due</u> <u>to Investment</u> <u>Income (1)</u>
Participant Options							
T. Rowe Price							
Stable Value Fund	\$ 183,384,227	\$ 377,400	\$ (774,805)	\$ 1,811,158	\$ 184,797,980	0.77%	0.21%
Small Cap Stock Fund	114,081,250	3,666,518	(17,668)	(445,956)	117,284,144	2.81%	3.22%
Alaska Balanced Trust	30,438,533	403,102	(79,164)	(189,917)	30,572,554	0.44%	1.33%
Long Term Balanced Fund	87,552,134	1,946,959	(711,904)	(468,495)	88,318,694	0.88%	2.24%
AK Target Date 2010 Trust	3,875,910	61,039	(100,144)	55,699	3,892,504	0.43%	1.58%
AK Target Date 2015 Trust	9,411,779	172,819	(16,884)	(136,119)	9,431,595	0.21%	1.85%
AK Target Date 2020 Trust	25,177,662	541,769	55,770	(914,286)	24,860,915	-1.26%	2.19%
AK Target Date 2025 Trust	18,970,723	479,563	152,041	439,676	20,042,003	5.65%	2.49%
AK Target Date 2030 Trust	12,553,015	347,230	111,871	13,987	13,026,103	3.77%	2.75%
AK Target Date 2035 Trust	7,631,367	232,734	101,210	160,089	8,125,400	6.47%	3.00%
AK Target Date 2040 Trust	8,247,599	263,921	79,856	83,306	8,674,682	5.18%	3.17%
AK Target Date 2045 Trust	6,028,258	200,148	94,766	8,759	6,331,931	5.04%	3.29%
AK Target Date 2050 Trust	3,900,319	131,966	86,287	316,082	4,434,654	13.70%	3.22%
AK Target Date 2055 Trust	4,187,288	138,193	52,893	(50,140)	4,328,234	3.37%	3.30%
AK Target Date 2060 Trust	914,951	30,331	12,947	(4,404)	953,825	4.25%	3.30%
Total Investments with T. Rowe Price	<u>516,355,015</u>	<u>8,993,692</u>	<u>(952,928)</u>	<u>679,439</u>	<u>525,075,218</u>		
State Street Global Advisors							
Money Market	15,561,051	28,753	(154,888)	(392,162)	15,042,754	-3.33%	0.19%
Russell 3000 Index	46,682,151	1,863,444	152,403	(973,763)	47,724,235	2.23%	4.03%
US Real Estate Investment Trust Index	14,354,042	(28,910)	36,638	(50,098)	14,311,672	-0.30%	-0.20%
World Equity Ex-US Index	20,257,930	548,127	117,424	481,573	21,405,054	5.66%	2.67%
US Treasury Inflation Protected Securities Index	17,365,344	55,449	(1,252)	324,146	17,743,687	2.18%	0.32%
Total Investments with SSgA	<u>114,220,518</u>	<u>2,466,863</u>	<u>150,325</u>	<u>(610,304)</u>	<u>116,227,402</u>		
BlackRock							
S&P 500 Index Fund	215,596,622	8,705,066	11,555	(1,724,187)	222,589,056	3.24%	4.05%
Passive U.S. Bond Index Fund	57,087,747	11,693	(119,611)	824,842	57,804,671	1.26%	0.02%
Total Investments with BlackRock	<u>272,684,369</u>	<u>8,716,759</u>	<u>(108,056)</u>	<u>(899,345)</u>	<u>280,393,727</u>		
Brandes/Baillie Gifford (2)							
AK International Equity Fund	33,678,467	1,482,864	84,245	(110,522)	35,135,054	4.32%	4.40%
Northern Trust							
Environmental, Social, and Governance Fund	22,196,058	833,003	(25,630)	940,732	23,944,163	7.88%	3.68%
Total All Funds	<u>\$ 959,134,427</u>	<u>\$ 22,493,181</u>	<u>\$ (852,044)</u>	<u>\$ -</u>	<u>\$ 980,775,564</u>	2.26%	2.35%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Deferred Compensation Plan
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
April 30, 2019
\$ (Thousands)

<u>Invested Assets</u> (at fair value)	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>
Investments with T. Rowe Price										
Interest Income Fund	\$ 175,629	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Stable Value Fund	-	179,111	178,901	181,148	181,120	183,242	181,109	182,424	183,384	184,798
Small Cap Stock Fund	114,946	121,797	119,170	108,520	110,186	98,100	108,577	115,520	114,081	117,284
Alaska Balanced Trust	29,501	30,253	30,453	29,783	29,587	29,690	29,950	30,192	30,439	30,573
Long Term Balanced Fund	91,224	91,105	90,275	84,960	85,535	81,754	85,786	86,573	87,552	88,319
AK Target Date 2010 Trust	4,051	4,078	4,033	3,719	3,714	3,627	3,793	3,825	3,876	3,893
AK Target Date 2015 Trust	9,541	9,477	9,462	8,904	8,919	8,424	8,683	9,073	9,412	9,432
AK Target Date 2020 Trust	26,229	26,594	26,248	24,788	24,957	23,259	24,338	24,860	25,178	24,861
AK Target Date 2025 Trust	17,470	18,025	18,796	17,895	17,951	17,041	18,159	18,925	18,971	20,042
AK Target Date 2030 Trust	11,744	12,182	12,394	11,761	11,977	11,442	12,352	12,338	12,553	13,026
AK Target Date 2035 Trust	6,910	7,082	7,175	7,003	7,245	6,777	7,332	7,555	7,631	8,125
AK Target Date 2040 Trust	7,998	8,245	8,258	7,661	7,798	7,372	8,008	8,215	8,248	8,675
AK Target Date 2045 Trust	5,688	5,882	6,020	5,585	5,698	5,209	5,727	5,844	6,028	6,332
AK Target Date 2050 Trust	3,958	4,104	4,123	3,927	4,169	3,803	4,162	4,117	3,900	4,435
AK Target Date 2055 Trust	4,248	4,300	4,309	3,993	4,058	3,604	3,939	4,046	4,187	4,328
AK Target Date 2060 Trust	399	873	885	871	891	831	904	926	915	954
State Street Global Advisors										
Money Market	13,653	13,538	13,947	13,871	13,719	15,762	15,328	15,380	15,561	15,043
Russell 3000 Index	43,890	45,212	46,616	44,549	45,322	40,964	45,029	46,338	46,682	47,724
US Real Estate Investment Trust Index	12,810	13,334	12,770	12,568	13,412	11,794	13,523	13,755	14,354	14,312
World Equity Ex-US Index	18,373	18,043	18,531	17,578	17,738	17,829	19,034	19,620	20,258	21,405
Long US Treasury Bond Index	5,169	-	-	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	13,533	14,313	15,603	15,686	15,910	15,962	16,285	16,211	17,365	17,744
World Government Bond Ex-US Index	4,626	-	-	-	-	-	-	-	-	-
Investments with BlackRock										
S&P 500 Index Fund	220,701	226,134	226,417	210,346	214,014	192,991	208,228	211,728	215,597	222,589
Passive U.S. Bond Index Fund	-	57,464	55,702	52,868	53,253	54,245	54,858	55,223	57,088	57,805
Government/Credit Bond Fund	27,364	-	-	-	-	-	-	-	-	-
Intermediate Bond Fund	22,131	-	-	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford										
AK International Equity Fund	38,417	37,121	36,340	32,598	32,467	30,963	33,398	33,777	33,678	35,135
Investments with Northern Trust										
Environmental, Social, and Governance Fund	23,391	23,420	23,413	21,103	22,227	19,502	20,500	21,663	22,196	23,944
Total Invested Assets	\$ 953,592	\$ 971,688	\$ 969,841	\$ 921,685	\$ 931,868	\$ 884,186	\$ 929,002	\$ 948,130	\$ 959,134	\$ 980,776
<u>Change in Invested Assets</u>										
Beginning Assets	\$ 938,807	\$ 953,592	\$ 971,688	\$ 969,841	\$ 921,685	\$ 931,868	\$ 884,186	\$ 929,002	\$ 948,130	\$ 959,134
Investment Earnings	17,321	18,962	(977)	(46,214)	12,333	(48,008)	48,001	21,731	9,666	22,493
Net Contributions (Withdrawals)	(2,536)	(866)	(869)	(1,943)	(2,150)	326	(3,184)	(2,604)	1,338	(852)
Ending Invested Assets	\$ 953,592	\$ 971,688	\$ 969,841	\$ 921,685	\$ 931,868	\$ 884,186	\$ 929,002	\$ 948,130	\$ 959,134	\$ 980,776

Defined Contribution Retirement - Participant Directed PERS
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
April 30, 2019

	<u>Beginning Invested</u>		<u>Net Contributions</u>		<u>Ending Invested</u>	<u>% Change in</u>	<u>% Change due</u>
	<u>Assets</u>	<u>Investment Income</u>	<u>(Withdrawals)</u>	<u>Transfers In (Out)</u>	<u>Assets</u>	<u>Invested</u>	<u>to Investment</u>
						<u>Assets</u>	<u>Income (1)</u>
Participant Options							
T. Rowe Price							
Stable Value Fund	\$ 45,115,214	\$ 94,310	\$ (48,763)	\$ 1,809,585	\$ 46,970,346	4.11%	0.21%
Small Cap Stock Fund	77,864,646	2,505,707	154,594	(421,341)	80,103,606	2.88%	3.22%
Alaska Balanced Trust	25,900,406	344,349	44,991	(295,585)	25,994,161	0.36%	1.34%
Long Term Balanced Fund	17,412,077	382,915	2,376	(903,726)	16,893,642	-2.98%	2.26%
AK Target Date 2010 Trust	2,579,079	39,828	(83,918)	(82,751)	2,452,238	-4.92%	1.60%
AK Target Date 2015 Trust	12,105,067	223,691	116,483	(91,230)	12,354,011	2.06%	1.85%
AK Target Date 2020 Trust	34,454,372	755,631	294,413	(14,241)	35,490,175	3.01%	2.18%
AK Target Date 2025 Trust	55,578,029	1,387,511	531,430	(85,067)	57,411,903	3.30%	2.49%
AK Target Date 2030 Trust	57,648,462	1,600,629	485,044	(294,469)	59,439,666	3.11%	2.77%
AK Target Date 2035 Trust	69,780,920	2,102,176	581,746	(128,206)	72,336,636	3.66%	3.00%
AK Target Date 2040 Trust	82,437,193	2,640,903	878,871	(135,689)	85,821,278	4.11%	3.19%
AK Target Date 2045 Trust	106,273,384	3,532,754	816,722	(153,257)	110,469,603	3.95%	3.31%
AK Target Date 2050 Trust	125,875,863	4,189,273	1,588,635	(447,557)	131,206,214	4.23%	3.31%
AK Target Date 2055 Trust	111,072,799	3,707,991	2,422,442	(426,496)	116,776,736	5.14%	3.31%
AK Target Date 2060 Trust	1,255,133	41,980	25,414	41,655	1,364,182	8.69%	3.26%
Total Investments with T. Rowe Price	<u>825,352,644</u>	<u>23,549,648</u>	<u>7,810,480</u>	<u>(1,628,375)</u>	<u>855,084,397</u>		
State Street Global Advisors							
Money Market	11,162,688	21,293	(32,704)	(60,667)	11,090,610	-0.65%	0.19%
S&P 500 Stock Index Fund Series A	107,025,304	4,320,920	281,451	(2,280,040)	109,347,635	2.17%	4.08%
Russell 3000 Index	12,120,620	482,760	93,216	(245,257)	12,451,339	2.73%	4.01%
US Real Estate Investment Trust Index	17,112,751	(33,301)	(1,162)	(128,511)	16,949,777	-0.95%	-0.20%
World Equity Ex-US Index	54,929,388	1,488,734	130,963	1,039,708	57,588,793	4.84%	2.68%
US Treasury Inflation Protected Securities Index	19,575,414	62,092	19,149	(102,235)	19,554,420	-0.11%	0.32%
Total Investments with SSgA	<u>221,926,165</u>	<u>6,342,498</u>	<u>490,913</u>	<u>(1,777,002)</u>	<u>226,982,574</u>		
BlackRock							
Passive U.S. Bond Index Fund	45,854,440	18,210	45,860	2,756,984	48,675,494	6.15%	0.04%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	42,019,690	1,830,678	100,303	(1,937,802)	42,012,869	-0.02%	4.45%
Northern Trust							
Environmental, Social, and Governance Fund	14,459,117	570,106	54,015	2,586,195	17,669,433	22.20%	3.61%
Total All Funds	<u>\$ 1,149,612,056</u>	<u>\$ 32,311,140</u>	<u>\$ 8,501,571</u>	<u>\$ -</u>	<u>\$ 1,190,424,767</u>	3.55%	2.80%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Defined Contribution Retirement - Participant Directed PERS
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
April 30, 2019
\$ (Thousands)

<u>Invested Assets (at fair value)</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>
Investments with T. Rowe Price										
Alaska Money Market	\$ 5,386	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Stable Value Fund	-	14,421	27,852	43,006	42,923	42,735	42,674	43,561	45,115	46,970
Small Cap Stock Fund	78,194	80,707	78,140	70,928	72,995	66,254	73,309	78,438	77,865	80,104
Alaska Balanced Trust	27,299	27,398	27,772	26,476	26,390	25,347	25,959	25,840	25,900	25,994
Long Term Balanced Fund	24,785	23,022	21,415	18,340	18,335	17,322	18,076	17,798	17,412	16,894
AK Target Date 2010 Trust	2,508	2,531	2,485	2,475	2,498	2,391	2,489	2,522	2,579	2,452
AK Target Date 2015 Trust	11,859	12,041	12,061	11,560	11,610	11,260	11,628	11,751	12,105	12,354
AK Target Date 2020 Trust	32,186	32,603	32,961	31,733	32,373	31,441	33,258	33,792	34,454	35,490
AK Target Date 2025 Trust	51,239	52,236	52,640	50,610	51,842	49,749	52,839	54,548	55,578	57,412
AK Target Date 2030 Trust	54,629	55,604	55,869	52,674	53,924	51,203	54,986	56,567	57,648	59,440
AK Target Date 2035 Trust	64,604	65,985	66,600	62,955	64,639	61,268	66,176	68,540	69,781	72,337
AK Target Date 2040 Trust	76,369	78,405	79,081	74,522	76,486	72,102	78,032	80,915	82,437	85,821
AK Target Date 2045 Trust	98,208	100,893	102,389	95,950	98,572	92,542	100,504	103,969	106,273	110,470
AK Target Date 2050 Trust	116,864	119,654	121,128	113,790	116,862	109,868	119,386	123,398	125,876	131,206
AK Target Date 2055 Trust	95,705	98,774	100,844	95,643	98,512	93,612	102,847	107,714	111,073	116,777
AK Target Date 2060 Trust	815	862	993	910	871	848	1,028	1,077	1,255	1,364
State Street Global Advisors										
Money Market	4,623	10,005	10,109	10,920	10,831	11,295	10,861	10,851	11,163	11,091
S&P 500 Stock Index Fund Series A	98,610	102,254	104,741	98,753	102,188	94,932	104,423	107,118	107,025	109,348
Russell 3000 Index	10,944	11,591	11,693	10,948	11,204	10,089	11,094	11,791	12,121	12,451
US Real Estate Investment Trust Index	16,265	16,461	15,806	15,382	16,180	14,906	16,494	16,616	17,113	16,950
World Equity Ex-US Index	46,988	47,280	49,117	46,658	47,989	47,138	51,636	53,823	54,929	57,589
Long US Treasury Bond Index	1,210	-	-	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	14,922	16,824	17,904	18,781	18,827	18,831	19,308	19,303	19,575	19,554
World Government Bond Ex-US Index	7,351	-	-	-	-	-	-	-	-	-
Investments with BlackRock										
Government/Credit Bond Fund	49,222	-	-	-	-	-	-	-	-	-
Passive U.S. Bond Index Fund	-	68,174	55,842	40,665	40,659	41,088	41,439	42,782	45,854	48,675
Intermediate Bond Fund	22,335	-	-	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford										
AK International Equity Fund	45,645	45,336	45,452	41,823	42,313	40,748	43,774	43,749	42,020	42,013
Investments with Northern Trust										
Environmental, Social, and Governance Fund	10,616	10,404	10,307	9,439	10,026	9,241	9,983	12,036	14,459	17,669
Total Invested Assets	\$ 1,069,378	\$ 1,093,466	\$ 1,103,203	\$ 1,044,943	\$ 1,069,048	\$ 1,016,210	\$ 1,092,202	\$ 1,128,499	\$ 1,149,612	\$ 1,190,425
<u>Change in Invested Assets</u>										
Beginning Assets	\$ 1,041,422	\$ 1,069,378	\$ 1,093,466	\$ 1,103,203	\$ 1,044,943	\$ 1,069,048	\$ 1,016,210	\$ 1,092,202	\$ 1,128,499	\$ 1,149,612
Investment Earnings	23,080	17,895	(334)	(66,086)	15,087	(63,567)	68,079	27,190	12,778	32,311
Net Contributions (Withdrawals)	4,876	6,192	10,071	7,826	9,018	10,729	7,912	9,107	8,335	8,502
Ending Invested Assets	\$ 1,069,378	\$ 1,093,466	\$ 1,103,203	\$ 1,044,943	\$ 1,069,048	\$ 1,016,210	\$ 1,092,202	\$ 1,128,499	\$ 1,149,612	\$ 1,190,425

Defined Contribution Retirement - Participant Directed TRS
Schedule of Investment Income and Changes in Invested Assets
for the Month Ended
April 30, 2019

	<u>Beginning Invested Assets</u>	<u>Investment Income</u>	<u>Net Contributions (Withdrawals)</u>	<u>Transfers In (Out)</u>	<u>Ending Invested Assets</u>	<u>% Change in Invested Assets</u>	<u>% Change due to Investment Income (1)</u>
Participant Options							
T. Rowe Price							
Stable Value Fund	\$ 18,559,859	\$ 39,057	\$ 85,023	\$ 869,669	\$ 19,553,608	5.35%	0.21%
Small Cap Stock Fund	33,131,220	1,066,926	166,376	(287,191)	34,077,331	2.86%	3.23%
Alaska Balanced Trust	10,942,566	145,810	49,337	(117,945)	11,019,768	0.71%	1.34%
Long Term Balanced Fund	7,362,289	162,647	38,753	(335,794)	7,227,895	-1.83%	2.25%
AK Target Date 2010 Trust	783,039	12,523	9,675	-	805,237	2.83%	1.59%
AK Target Date 2015 Trust	3,555,469	65,939	43,670	-	3,665,078	3.08%	1.84%
AK Target Date 2020 Trust	10,241,796	224,759	122,501	-	10,589,056	3.39%	2.18%
AK Target Date 2025 Trust	18,043,210	451,683	145,638	344,836	18,985,367	5.22%	2.47%
AK Target Date 2030 Trust	21,329,287	592,397	263,505	(109,471)	22,075,718	3.50%	2.77%
AK Target Date 2035 Trust	31,643,885	952,096	290,868	(219,295)	32,667,554	3.23%	3.01%
AK Target Date 2040 Trust	33,972,172	1,086,490	401,827	(166,455)	35,294,034	3.89%	3.19%
AK Target Date 2045 Trust	51,229,776	1,701,543	435,853	(89,187)	53,277,985	4.00%	3.31%
AK Target Date 2050 Trust	71,588,203	2,379,198	677,169	(75,569)	74,569,001	4.16%	3.31%
AK Target Date 2055 Trust	36,919,007	1,231,660	776,746	(93,888)	38,833,525	5.19%	3.31%
AK Target Date 2060 Trust	319,183	11,056	40,429	(4,298)	366,370	14.78%	3.28%
Total Investments with T. Rowe Price	<u>349,620,961</u>	<u>10,123,784</u>	<u>3,547,370</u>	<u>(284,588)</u>	<u>363,007,527</u>		
State Street Global Advisors							
Money Market	3,227,985	6,185	(882)	(14,830)	3,218,458	-0.30%	0.19%
S&P 500 Stock Index Fund Series A	43,084,621	1,739,164	162,300	(1,121,655)	43,864,430	1.81%	4.08%
Russell 3000 Index	3,944,898	159,062	37,075	(6,576)	4,134,459	4.81%	4.02%
US Real Estate Investment Trust Index	6,970,263	(13,617)	35,415	(126,766)	6,865,295	-1.51%	-0.20%
World Equity Ex-US Index	24,683,528	669,066	123,833	389,088	25,865,515	4.79%	2.68%
US Treasury Inflation Protected Securities Index	7,139,330	22,672	30,588	(42,594)	7,149,996	0.15%	0.32%
Total Investments with SSgA	<u>89,050,625</u>	<u>2,582,532</u>	<u>388,329</u>	<u>(923,333)</u>	<u>91,098,153</u>		
BlackRock							
Passive U.S. Bond Index Fund	18,229,595	7,439	91,294	1,139,161	19,467,489	6.79%	0.04%
Brandes/Baillie Gifford (2)							
AK International Equity Fund	18,619,117	810,856	101,316.00	(996,532)	18,534,757	-0.45%	4.46%
Northern Trust							
Environmental, Social, and Governance Fund	5,989,608	236,299	34,581.00	1,065,292	7,325,780	22.31%	3.61%
Total All Funds	<u>\$ 481,509,906</u>	<u>\$ 13,760,910</u>	<u>\$ 4,162,890</u>	<u>\$ -</u>	<u>\$ 499,433,706</u>	3.72%	2.85%

Notes: Source data provided by the record keeper, Empower Retirement.

(1) Income divided by beginning assets plus half of net contributions/(withdrawals). Actual returns are calculated by Callan and Associates.

(2) This investment is comprised of two funds, Brandes International Equity Fund and Baillie Gifford International Equity Fund.

Defined Contribution Retirement - Participant Directed TRS
Schedule of Invested Assets with
Schedule of Investment Income and Changes in Invested Assets
By Month Through the Month Ended
April 30, 2019
\$ (Thousands)

<u>Invested Assets (at fair value)</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>
Investments with T. Rowe Price										
Alaska Money Market	\$ 1,894	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Stable Value Fund	-	5,764	10,959	17,254	17,485	17,146	17,336	17,589	18,560	19,554
Small Cap Stock Fund	34,424	35,326	33,876	30,707	31,368	28,362	31,303	33,440	33,131	34,077
Alaska Balanced Trust	11,394	11,458	11,456	11,077	10,957	10,683	10,990	10,877	10,943	11,020
Long Term Balanced Fund	10,335	9,630	8,893	7,621	7,648	7,279	7,660	7,543	7,362	7,228
AK Target Date 2010 Trust	826	836	843	725	727	715	745	763	783	805
AK Target Date 2015 Trust	3,397	3,396	3,354	3,221	3,360	3,289	3,421	3,503	3,555	3,665
AK Target Date 2020 Trust	9,951	9,943	9,992	9,600	9,743	9,385	9,781	10,080	10,242	10,589
AK Target Date 2025 Trust	16,938	17,131	17,113	16,474	16,761	16,150	17,177	17,761	18,043	18,985
AK Target Date 2030 Trust	20,121	20,288	20,233	19,384	19,641	18,873	20,261	20,836	21,329	22,076
AK Target Date 2035 Trust	29,766	29,990	30,167	28,528	29,335	27,880	30,050	31,227	31,644	32,668
AK Target Date 2040 Trust	31,409	31,857	32,148	30,214	31,092	29,380	31,909	33,100	33,972	35,294
AK Target Date 2045 Trust	48,740	49,511	49,641	46,683	47,610	44,891	48,452	50,276	51,230	53,278
AK Target Date 2050 Trust	68,156	69,233	69,024	65,046	66,485	62,663	67,677	70,008	71,588	74,569
AK Target Date 2055 Trust	32,138	32,606	32,751	31,327	32,485	31,065	34,175	35,746	36,919	38,834
AK Target Date 2060 Trust	179	195	250	238	244	229	302	312	319	366
State Street Global Advisors										
Money Market	690	2,573	2,677	2,894	2,746	2,966	3,022	3,071	3,228	3,218
S&P 500 Stock Index Fund Series A	41,127	42,492	42,944	40,386	41,452	38,385	42,005	43,075	43,085	43,864
Russell 3000 Index	3,621	3,663	3,757	3,505	3,634	3,305	3,605	3,758	3,945	4,134
US Real Estate Investment Trust Index	6,751	6,695	6,396	6,212	6,577	6,053	6,649	6,745	6,970	6,865
World Equity Ex-US Index	21,323	21,370	22,069	21,074	21,523	21,065	22,994	24,029	24,684	25,866
Long US Treasury Bond Index	306	-	-	-	-	-	-	-	-	-
US Treasury Inflation Protected Securities Index	5,367	6,094	6,486	6,939	6,924	6,951	7,043	6,981	7,139	7,150
World Government Bond Ex-US Index	2,765	-	-	-	-	-	-	-	-	-
Investments with BlackRock										
Government/Credit Bond Fund	20,232	-	-	-	-	-	-	-	-	-
Passive U.S. Bond Index Fund	-	26,480	21,597	15,809	15,796	16,050	16,290	16,885	18,230	19,467
Intermediate Bond Fund	8,292	-	-	-	-	-	-	-	-	-
Investments with Brandes/Baillie Gifford										
AK International Equity Fund	20,619	20,325	20,320	18,707	18,782	18,035	19,345	19,351	18,619	18,535
Investments with Northern Trust										
Environmental, Social, and Governance Fund	4,614	4,398	4,270	3,858	4,047	3,795	4,063	4,935	5,990	7,326
Total Invested Assets	\$ 455,376	\$ 461,254	\$ 461,219	\$ 437,483	\$ 446,422	\$ 424,594	\$ 456,258	\$ 471,890	\$ 481,510	\$ 499,434
<u>Change in Invested Assets</u>										
Beginning Assets	\$ 442,323	\$ 455,376	\$ 461,254	\$ 461,219	\$ 437,483	\$ 446,422	\$ 424,594	\$ 456,258	\$ 471,890	\$ 481,510
Investment Earnings	10,017	7,587	(129)	(28,187)	6,395	(27,052)	28,939	11,560	5,316	13,761
Net Contributions (Withdrawals)	3,036	(1,709)	95	4,451	2,543	5,224	2,725	4,072	4,304	4,163
Ending Invested Assets	\$ 455,376	\$ 461,254	\$ 461,219	\$ 437,483	\$ 446,422	\$ 424,594	\$ 456,258	\$ 471,890	\$ 481,510	\$ 499,434

ALASKA RETIREMENT MANAGEMENT BOARD

FINANCIAL REPORT

(Supplement to the Treasury Division Report)

As of April 30, 2019

Prepared by the Division of Retirement & Benefits

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Ten Months Ending April 30, 2019

	Contributions				Expenditures				Net
	Contributions EE and ER	State of Alaska	Other	Total Contributions	Benefits	Refunds & Disbursements	Administrative & Investment	Total Expenditures	Contributions/ (Withdrawals)
Public Employees' Retirement System (PERS)									
<u>Defined Benefit Plans:</u>									
Retirement Trust	\$ 305,654,668	\$ 135,508,000	\$ 20,526	\$ 441,183,194	\$ (702,158,440)	\$ (9,124,508)	\$ (6,007,902)	\$ (717,290,850)	\$ (276,107,656)
Retirement Health Care Trust	84,570,141	-	43,154,079	127,724,220	(370,459,623)	-	(15,228,033)	(385,687,656)	(257,963,436)
Total Defined Benefit Plans	390,224,809	135,508,000	43,174,605	568,907,414	(1,072,618,063)	(9,124,508)	(21,235,935)	(1,102,978,506)	(534,071,092)
<u>Defined Contribution Plans:</u>									
Participant Directed Retirement	133,024,401	-	-	133,024,401	-	(46,776,871)	(3,678,300)	(50,455,171)	82,569,230
Health Reimbursement Arrangement ^(a)	34,810,916	-	-	34,810,916	(83,198)	-	(139,993)	(223,191)	34,587,725
Retiree Medical Plan ^(a)	9,844,818	-	21,580	9,866,398	(266,765)	-	(49,685)	(316,450)	9,549,948
Occupational Death and Disability: ^(a)									
All Others	2,227,505	-	-	2,227,505	(104,287)	-	(8,335)	(112,622)	2,114,883
Peace Officers and Firefighters	1,023,976	-	-	1,023,976	(238,503)	-	(4,095)	(242,598)	781,378
Total Defined Contribution Plans	180,931,616	-	21,580	180,953,196	(692,753)	(46,776,871)	(3,880,408)	(51,350,032)	129,603,164
Total PERS	571,156,425	135,508,000	43,196,185	749,860,610	(1,073,310,816)	(55,901,379)	(25,116,343)	(1,154,328,538)	(404,467,928)
Teachers' Retirement System (TRS)									
<u>Defined Benefit Plans:</u>									
Retirement Trust	54,287,418	128,174,000	25,309	182,486,727	(393,821,994)	(2,165,896)	(3,164,484)	(399,152,374)	(216,665,647)
Retirement Health Care Trust	14,080,634	-	13,927,384	28,008,018	(121,107,150)	-	(5,639,464)	(126,746,614)	(98,738,596)
Total Defined Benefit Plans	68,368,052	128,174,000	13,952,693	210,494,745	(514,929,144)	(2,165,896)	(8,803,948)	(525,898,988)	(315,404,243)
<u>Defined Contribution Plans:</u>									
Participant Directed Retirement	42,987,603	-	-	42,987,603	-	(12,718,041)	(1,366,403)	(14,084,444)	28,903,159
Health Reimbursement Arrangement ^(a)	8,665,316	-	-	8,665,316	(27,194)	-	(41,833)	(69,027)	8,596,289
Retiree Medical Plan ^(a)	2,361,222	-	9,803	2,371,025	(98,429)	-	(18,994)	(117,423)	2,253,602
Occupational Death and Disability ^(a)	200,728	-	-	200,728	(20,246)	-	(1,327)	(21,573)	179,155
Total Defined Contribution Plans	54,214,869	-	9,803	54,224,672	(145,869)	(12,718,041)	(1,428,557)	(14,292,467)	39,932,205
Total TRS	122,582,921	128,174,000	13,962,496	264,719,417	(515,075,013)	(14,883,937)	(10,232,505)	(540,191,455)	(275,472,038)
Judicial Retirement System (JRS)									
Defined Benefit Plan Retirement Trust	4,994,168	4,909,000	-	9,903,168	(11,368,575)	-	(104,314)	(11,472,889)	(1,569,721)
Defined Benefit Retirement Health Care Trust	516,283	-	136,094	652,377	(903,998)	-	(51,892)	(955,890)	(303,513)
Total JRS	5,510,451	4,909,000	136,094	10,555,545	(12,272,573)	-	(156,206)	(12,428,779)	(1,873,234)
National Guard/Naval Militia Retirement System (NGNMRS)									
Defined Benefit Plan Retirement Trust ^(a)	851,686	-	-	851,686	(1,222,215)	-	(110,321)	(1,332,536)	(480,850)
Other Participant Directed Plans									
Supplemental Annuity Plan	144,079,374	-	-	144,079,374	-	(180,219,718)	(5,954,962)	(186,174,680)	(42,095,306)
Deferred Compensation Plan	37,168,841	-	-	37,168,841	-	(48,947,658)	(1,560,493)	(50,508,151)	(13,339,310)
Total All Funds	881,349,698	268,591,000	57,294,775	1,207,235,473	(1,601,880,617)	(299,952,692)	(43,130,830)	(1,944,964,139)	(737,728,666)
Total Non-Participant Directed	524,089,479	268,591,000	57,294,775	849,975,254	(1,601,880,617)	(11,290,404)	(30,570,672)	(1,643,741,693)	(793,766,439)
Total Participant Directed	357,260,219	-	-	357,260,219	-	(288,662,288)	(12,560,158)	(301,222,446)	56,037,773
Total All Funds	\$ 881,349,698	\$ 268,591,000	\$ 57,294,775	\$ 1,207,235,473	\$ (1,601,880,617)	\$ (299,952,692)	\$ (43,130,830)	\$ (1,944,964,139)	\$ (737,728,666)

(a) Employer only contributions.

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Month Ended April 30, 2019

	Contributions				Expenditures				Net
	Contributions EE and ER	State of Alaska	Other	Total Contributions	Benefits	Refunds & Disbursements	Administrative & Investment	Total Expenditures	Contributions/ (Withdrawals)
Public Employees' Retirement System (PERS)									
<u>Defined Benefit Plans:</u>									
Retirement Trust	\$ 31,131,873	\$ 141,000	\$ 2,366	\$ 31,275,239	\$ (71,069,236)	\$ (717,542)	\$ (489,020)	\$ (72,275,798)	\$ (41,000,559)
Retirement Health Care Trust	8,824,231	-	1,151,117	9,975,348	(34,610,279)	-	(2,764,972)	(37,375,251)	(27,399,903)
Total Defined Benefit Plans	39,956,104	141,000	1,153,483	41,250,587	(105,679,515)	(717,542)	(3,253,992)	(109,651,049)	(68,400,462)
<u>Defined Contribution Plans:</u>									
Participant Directed Retirement	14,287,791	-	-	14,287,791	-	(5,289,012)	(497,208)	(5,786,220)	8,501,571
Health Reimbursement Arrangement ^(a)	3,812,097	-	-	3,812,097	(20,834)	-	(14,212)	(35,046)	3,777,051
Retiree Medical Plan ^(a)	1,064,343	-	1,472	1,065,815	(28,643)	-	(6,230)	(34,873)	1,030,942
Occupational Death and Disability: ^(a)									
All Others	246,578	-	-	246,578	(10,431)	-	(784)	(11,215)	235,363
Peace Officers and Firefighters	113,601	-	-	113,601	(27,606)	-	(392)	(27,998)	85,603
Total Defined Contribution Plans	19,524,410	-	1,472	19,525,882	(87,514)	(5,289,012)	(518,826)	(5,895,352)	13,630,530
Total PERS	59,480,514	141,000	1,154,955	60,776,469	(105,767,029)	(6,006,554)	(3,772,818)	(115,546,401)	(54,769,932)
Teachers' Retirement System (TRS)									
<u>Defined Benefit Plans:</u>									
Retirement Trust	6,138,949	-	2,248	6,141,197	(39,320,061)	(45,524)	(265,183)	(39,630,768)	(33,489,571)
Retirement Health Care Trust	1,652,867	-	410,497	2,063,364	(11,584,486)	-	(1,024,527)	(12,609,013)	(10,545,649)
Total Defined Benefit Plans	7,791,816	-	412,745	8,204,561	(50,904,547)	(45,524)	(1,289,710)	(52,239,781)	(44,035,220)
<u>Defined Contribution Plans:</u>									
Participant Directed Retirement	5,272,238	-	-	5,272,238	-	(896,156)	(213,192)	(1,109,348)	4,162,890
Health Reimbursement Arrangement ^(a)	1,073,912	-	-	1,073,912	(3,428)	-	(4,267)	(7,695)	1,066,217
Retiree Medical Plan ^(a)	282,573	-	(83)	282,490	(5,489)	-	(2,147)	(7,636)	274,854
Occupational Death and Disability ^(a)	27,857	-	-	27,857	(2,025)	-	(131)	(2,156)	25,701
Total Defined Contribution Plans	6,656,580	-	(83)	6,656,497	(10,942)	(896,156)	(219,737)	(1,126,835)	5,529,662
Total TRS	14,448,396	-	412,662	14,861,058	(50,915,489)	(941,680)	(1,509,447)	(53,366,616)	(38,505,558)
Judicial Retirement System (JRS)									
Defined Benefit Plan Retirement Trust	460,048	-	-	460,048	(1,168,147)	-	(12,280)	(1,180,427)	(720,379)
Defined Benefit Retirement Health Care Trust	47,414	-	3,551	50,965	(158,950)	-	(9,716)	(168,666)	(117,701)
Total JRS	507,462	-	3,551	511,013	(1,327,097)	-	(21,996)	(1,349,093)	(838,080)
National Guard/Naval Militia Retirement System (NGNMRS)									
Defined Benefit Plan Retirement Trust ^(a)	-	-	-	-	(121,474)	-	(11,564)	(133,038)	(133,038)
Other Participant Directed Plans									
Supplemental Annuity Plan	18,989,916	-	-	18,989,916	-	(19,030,670)	(630,646)	(19,661,316)	(671,400)
Deferred Compensation Plan	3,577,600	-	-	3,577,600	-	(4,231,561)	(198,083)	(4,429,644)	(852,044)
Total All Funds	97,003,888	141,000	1,571,168	98,716,056	(158,131,089)	(30,210,465)	-	(194,486,108)	(95,770,052)
Total Non-Participant Directed	54,876,343	141,000	1,571,168	56,588,511	(158,131,089)	(763,066)	(4,605,425)	(163,499,580)	(106,911,069)
Total Participant Directed	42,127,545	-	-	42,127,545	-	(29,447,399)	(1,539,129)	(30,986,528)	11,141,017
Total All Funds	\$ 97,003,888	\$ 141,000	\$ 1,571,168	\$ 98,716,056	\$ (158,131,089)	\$ (30,210,465)	\$ (6,144,554)	\$ (194,486,108)	\$ (95,770,052)

(a) Employer only contributions

ALASKA RETIREMENT MANAGEMENT BOARD
SCHEDULE OF NON-INVESTMENT CHANGES BY FUND
(Supplement to the Treasury Division Report)
For the Ten Months Ending April 30, 2019

PARTICIPANT DIRECTED DISBURSEMENTS BY PLAN AND BY TYPE

	<u>PERS DCR Plan</u>	<u>TRS DCR Plan</u>	<u>Supplemental Annuity Plan</u>	<u>Deferred Compensation</u>	<u>TOTAL</u>	<u>% of Total</u>
Payment to Beneficiary	\$ 14,127	\$ -	\$ 182,635	\$ 145,387	\$ 342,149	0.1%
Death Benefit	633,137	76,943	9,600,708	1,614,973	11,925,761	4.1%
Disability / Hardship	85,714	-	120,216	110,216	316,146	0.1%
Minimum Required Distribution	78,190	16,803	7,839,165	2,906,242	10,840,400	3.8%
Qualified Domestic Relations Order	782,311	15,001	3,767,750	536,210	5,101,272	1.8%
Separation from Service / Retirement	45,183,392	12,609,294	157,692,826	43,477,637	258,963,149	89.7%
Purchase of Service Credit	-	-	1,016,418	156,993	1,173,411	0.4%
Transfer to a Qualifying Plan	-	-	-	-	-	0.0%
TOTAL	<u><u>\$ 46,776,871</u></u>	<u><u>\$ 12,718,041</u></u>	<u><u>\$ 180,219,718</u></u>	<u><u>\$ 48,947,658</u></u>	<u><u>\$ 288,662,288</u></u>	<u><u>100.0%</u></u>

Notes for the DRB Supplement to the Treasury Report

April 2019

This report is the DRB supplement to the Treasury Division's Financial Report. It expands their "Net Contributions (Withdrawals)" column into contributions and expenditures. It shows contributions received from both employees and employers, contributions from the State of Alaska, and other non-investment income. It also expands expenditures into benefits, refunds & disbursements, and administrative & investment expenditures. The net amount of total contributions and total expenditures, presented as "Net Contributions (Withdrawals)", agrees with the same column in the Treasury Division's Report. Page one shows the year-to-date totals for the first ten months of Fiscal Year 2019, while page two shows only the month of April 2019.

Highlights – On page one, for the ten months ending April 30, 2019:

- PERS DB Pension – Average employer and employee contributions of \$30.6 million per month; benefit payments of approximately \$70.2 million per month; refunds average \$912 thousand; and Administrative and Investment expenditures of \$601 thousand per month (DOR and DRB).
- PERS DB Healthcare – Average employer contributions of \$8.5 million per month; other income of \$20.1 million from Aetna Rx rebates (most recently received in March for 3rd Quarter CY2018), \$19.5 million from Medicare drug subsidy (most recently received in March for CY2017 Final True Up) and \$3.4 million from monthly EGWP subsidies; benefit payments of approximately \$37 million per month; and average Administrative and Investment expenditures of \$1.5 million per month (DOR and DRB).
- PERS DC Pension – Average employer and employee contributions of \$13.3 million per month; participant disbursements average \$4.7 million per month; and average Administrative and Investment expenditures of \$368 thousand per month (DOR and DRB).
- PERS DCR Health – For HRA, RMP, and OD&D, only employer contributions average \$4.8 million per month on behalf of participating employees; benefit payments of approximately \$69 thousand per month. Currently, 42 benefits are being paid from the Occupational Death & Disability plans, 26 retirees are participating in RMP, and 39 retirees are participating in HRA. Administrative and investment expenditures were approximately \$20 thousand per month (DOR and DRB).
- TRS DB Pension - Average employer and employee contributions of \$5.4 million per month; benefit payments of approximately \$39.4 million per month; refunds average \$217 thousand; and average Administrative and Investment expenditures of \$316 thousand per month (DOR and DRB).
- TRS DB Healthcare – Average employer contributions of \$1.4 million per month; other income of \$6.3 million from Aetna Rx rebates (most recently received in March for 3rd Quarter CY2018), \$6.4 million from Medicare drug subsidy (most recently received in March for CY2017 Final True Up) and \$1.2 million from monthly EGWP subsidies; benefit payments of approximately \$12.1 million per month; and average Administrative and Investment expenditures of \$564 thousand per month (DOR and DRB).

- TRS DC Pension – Average employer and employee contributions of \$4.3 million per month; participant disbursements average \$1.3 million per month; and average Administrative and investment expenditures of \$137 thousand per month (DOR and DRB).
- TRS DCR Health – For HRA, RMP, and OD&D, only employer contributions average \$1.1 million per month on behalf of participating employees; benefit payments of approximately \$15 thousand per month. Currently, 9 benefits are being paid from the Occupational Death & Disability plans, 11 retirees are participating in RMP, and 12 retirees are participating in HRA. Administrative and investment expenditures were approximately \$6 thousand per month (DOR and DRB).
- JRS Pension – Average employer and employee contributions of \$499 thousand per month; benefit payments of approximately \$1.1 million per month; and average Administrative and Investment expenditures of \$10 thousand per month (DOR and DRB).
- JRS Healthcare – Average employer contributions of \$52 thousand per month; other income of \$54 thousand from Aetna Rx rebates (most recently received in March for 3rd Quarter CY2018), \$70 thousand from Medicare drug subsidy (most recently received in March for CY2017 Final True Up) and \$11 thousand from monthly EGWP subsidies; benefit payments of approximately \$90 thousand per month; and average Administrative and Investment expenditures of \$5 thousand per month (DOR and DRB).
- NGNMRS – Annual contribution from DMVA in the amount of \$852 thousand was received in July; combination of lump-sum and monthly benefit payments of \$122 thousand per month; and average Administrative and Investment expenditures of \$11 thousand per month (DOR and DRB).
- SBS – Average employer and employee contributions and transfers in of \$14.4 million per month. Participant disbursements average of \$18 million per month; and average Administrative and Investment expenditures of \$595 thousand per month (DOR and DRB).
- Deferred Compensation – Average member-only contributions and transfers in of \$3.7 million per month; participant disbursements average of \$4.9 million per month; and average Administrative and Investment expenditures of \$156 thousand per month (DOR and DRB).

Highlights – On page two, activity for the one month of April 2019 only:

- PERS DB Healthcare – Other income of \$1.1 million from monthly EGWP subsidies.
- TRS DB Healthcare – Other income of \$410 thousand from monthly EGWP subsidies.
- JRS Healthcare – Other income of \$3 thousand from monthly EGWP subsidies.
- All other funds – Nothing significant to report

If you have any questions or comments, please let me know.

State of Alaska Retirement Systems

Presentation to Actuarial Committee & ARMB

June 30, 2018 Valuation Results

June 19 & 20, 2019

BUCK

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1. Purpose of the Valuation

Purpose of the Valuation

1. Measure plan's funded status as of June 30, 2018
2. Compare actual FY18 experience (liabilities and assets) to expected experience based on 2017 valuation assumptions
3. Calculate effects of new assumptions/methods from experience study
4. Identify effects of EGWP implementation*
5. Provide basis for setting FY21 contribution rates

* Applicable to PERS/TRS (DB) and JRS only. EGWP was already reflected in the 2017 DCR valuations, so the EGWP figures shown for the DCR plans are the effects of updated EGWP savings estimates.

2. Highlights of 2018 Valuation Results

Highlights of 2018 Valuation Results

PERS and TRS - DB

1. Estimated FY18 asset returns, net of expenses: 8.2% (market), 6.1% (actuarial)
2. Funded ratio (actuarial assets): Increased from 76.7% to 76.9% for PERS, from 82.0% to 84.7% for TRS
3. See slide 14 for sources of FY18 gains/losses
4. New assumptions/methods from the experience study: Actuarial Accrued Liability as of June 30, 2018 increased by approximately \$1.3B (6.1%) for PERS, \$96M (0.9%) for TRS
5. EGWP implementation effective January 1, 2019: Healthcare Actuarial Accrued Liability as of June 30, 2018 decreased by approximately \$711M (8.5%) for PERS, \$248M for TRS (8.4%)

Highlights of 2018 Valuation Results

PERS and TRS - DCR

1. Estimated FY18 asset returns, net of expenses: 8.0% (market), 7.9% (actuarial)
2. Funded ratio (actuarial assets): Increased from 92.5% to 103.8% for PERS DCR, from 102.6% to 125.1% for TRS DCR
3. See slide 15 for sources of FY18 gains/losses
4. New assumptions/methods from the experience study: Actuarial Accrued Liability as of June 30, 2018 decreased by approximately \$11M (7.5%) for PERS DCR, \$10M (22.1%) for TRS DCR
5. Updated EGWP savings estimates: Healthcare Actuarial Accrued Liability as of June 30, 2018 decreased by approximately \$4M (3.4%) for PERS DCR, \$1M (3.3%) for TRS DCR

Highlights of 2018 Valuation Results

JRS and NGNMRS

1. Estimated FY18 asset returns, net of expenses:
 - a) Market: 8.3% (JRS), 4.6% (NGNMRS)
 - b) Actuarial: 8.0% (JRS), 5.3% (NGNMRS)
2. Funded ratio (actuarial assets): Increased from 84.1% to 86.4% for JRS, from 122.0% to 185.4% for NGNMRS
3. See slide 16 for sources of FY18 gains/losses
4. New assumptions/methods from the experience study: Actuarial Accrued Liability as of June 30, 2018 increased by approximately \$13M (5.6%) for JRS, \$0.4M (1.6%) for NGNMRS
5. EGWP implementation effective January 1, 2019: Healthcare Actuarial Accrued Liability as of June 30, 2018 decreased by approximately \$1.7M (9.0%) for JRS
6. The Actuarial Accrued Liability as of June 30, 2018 for NGNMRS decreased by \$10.7M due to the elimination of 798 participants from the data because they received a cash out prior to June 30, 2016

3. Assets, Liabilities and Funded Ratios 2018 vs. 2017

Assets, Liabilities and Funded Ratios

PERS and TRS - DB

(\$000's)	PERS			TRS		
	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>
<u>June 30, 2018</u>						
Actuarial Accrued Liability (AAL)	14,606,033	7,658,104	22,264,137	7,276,290	2,684,150	9,960,440
Actuarial Value of Assets (AVA)	<u>9,430,192</u>	<u>7,686,509</u>	<u>17,116,701</u>	<u>5,541,600</u>	<u>2,898,709</u>	<u>8,440,309</u>
Unfunded Actuarial Accrued Liability	5,175,841	(28,405)	5,147,436	1,734,690	(214,559)	1,520,131
Funded Ratio (AVA/AAL)	64.6%	100.4%	76.9%	76.2%	108.0%	84.7%
<u>June 30, 2017</u>						
Actuarial Accrued Liability (AAL)	13,832,130	8,049,265	21,881,395	7,217,525	2,927,093	10,144,618
Actuarial Value of Assets (AVA)	<u>9,229,703</u>	<u>7,557,068</u>	<u>16,786,771</u>	<u>5,476,835</u>	<u>2,836,802</u>	<u>8,313,637</u>
Unfunded Actuarial Accrued Liability	4,602,427	492,197	5,094,624	1,740,690	90,291	1,830,981
Funded Ratio (AVA/AAL)	66.7%	93.9%	76.7%	75.9%	96.9%	82.0%

Assets, Liabilities and Funded Ratios

PERS and TRS - DCR

(\$000's)		PERS DCR			TRS DCR		
	<u>Occ D&D</u>	<u>Healthcare</u>	<u>Total</u>		<u>Occ D&D</u>	<u>Healthcare</u>	<u>Total</u>
<u>June 30, 2018</u>							
Actuarial Accrued Liability (AAL)	7,713	118,598	126,311		30	32,429	32,459
Actuarial Value of Assets (AVA)	<u>30,961</u>	<u>100,097</u>	<u>131,058</u>		<u>3,845</u>	<u>36,776</u>	<u>40,621</u>
Unfunded Actuarial Accrued Liability	(23,248)	18,501	(4,747)		(3,815)	(4,347)	(8,162)
Funded Ratio (AVA/AAL)	401.4%	84.4%	103.8%		12,816.7%	113.4%	125.1%
<u>June 30, 2017</u>							
Actuarial Accrued Liability (AAL)	7,540	109,703	117,243		26	33,681	33,707
Actuarial Value of Assets (AVA)	<u>26,944</u>	<u>81,559</u>	<u>108,503</u>		<u>3,588</u>	<u>30,998</u>	<u>34,586</u>
Unfunded Actuarial Accrued Liability	(19,404)	28,144	8,740		(3,562)	2,683	(879)
Funded Ratio (AVA/AAL)	357.3%	74.3%	92.5%		13,800.0%	92.0%	102.6%

Assets, Liabilities and Funded Ratios

JRS and NGNMRS

(\$000's)		JRS		NGNMRS
	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>	<u>Pension</u>
<u>June 30, 2018</u>				
Actuarial Accrued Liability (AAL)	226,560	16,847	243,407	22,137
Actuarial Value of Assets (AVA)	<u>178,489</u>	<u>31,868</u>	<u>210,357</u>	<u>41,031</u>
Unfunded Actuarial Accrued Liability	48,071	(15,021)	33,050	(18,894)
Funded Ratio (AVA/AAL)	78.8%	189.2%	86.4%	185.4%
<u>June 30, 2017</u>				
Actuarial Accrued Liability (AAL)	216,673	16,874	233,547	32,484
Actuarial Value of Assets (AVA)	<u>165,876</u>	<u>30,468</u>	<u>196,344</u>	<u>39,639</u>
Unfunded Actuarial Accrued Liability	50,797	(13,594)	37,203	(7,155)
Funded Ratio (AVA/AAL)	76.6%	180.6%	84.1%	122.0%

4. FY18 Actuarial (Gains)/Losses Excluding Experience Study Effects

FY18 Actuarial (Gains)/Losses Excluding Experience Study Effects

PERS and TRS - DB

(\$000's)	PERS			TRS		
	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>
Liabilities						
- Demographic Experience	24,923	(20,598)	4,325	9,753	(10,573)	(820)
- Changes in Dependent Coverage Elections	n/a	(69,614)	(69,614)	n/a	(18,765)	(18,765)
- Salary Increases	(97,200)	n/a	(97,200)	(41,455)	n/a	(41,455)
- COLA/PRPA Increases	(108,227)	n/a	(108,227)	(80,819)	n/a	(80,819)
- Medical Claims Experience	n/a	(412,243)	(412,243)	n/a	(146,354)	(146,354)
- Rehires	(7,141)	(5,948)	(13,089)	(3,115)	146	(2,969)
- Modified Part B Only Assumption	n/a	(235,258)	(235,258)	n/a	(23,321)	(23,321)
- Other	<u>(37,466)</u>	<u>19,667</u>	<u>(17,799)</u>	<u>(9,475)</u>	<u>6,683</u>	<u>(2,792)</u>
- Total Liabilities	(225,111)	(723,994)	(949,105)	(125,111)	(192,184)	(317,295)
Assets	168,150	130,059	298,209	95,829	47,311	143,140
EGWP - Implementation	n/a	(710,657)	(710,657)	n/a	(247,660)	(247,660)
Actual vs Expected Contributions	43,949	20,170	64,119	(2,782)	5,688	2,906

FY18 Actuarial (Gains)/Losses Excluding Experience Study Effects

PERS and TRS - DCR

(\$000's)	PERS DCR			TRS DCR		
	<u>Occ D&D</u>	<u>Healthcare</u>	<u>Total</u>	<u>Occ D&D</u>	<u>Healthcare</u>	<u>Total</u>
Liabilities						
- Demographic Experience	(3,304)	(4,343)	(7,647)	(274)	(887)	(1,161)
- Salary Increases	(40)	n/a	(40)	0	n/a	0
- Medical Claims Experience	n/a	(759)	(759)	n/a	(290)	(290)
- New Entrants/Rehires	193	4,350	4,543	1	3,698	3,699
- Cadillac Tax Initial Measurement	n/a	1,605	1,605	n/a	375	375
- Other	<u>183</u>	<u>(825)</u>	<u>(642)</u>	<u>20</u>	<u>190</u>	<u>210</u>
- Total Liabilities	(2,968)	28	(2,940)	(253)	3,086	2,833
Assets	33	59	92	5	69	74
EGWP - Updated Estimates	n/a	(4,114)	(4,114)	n/a	(1,122)	(1,122)
Actual vs Expected Contributions	83	3,913	3,996	(9)	458	449

FY18 Actuarial (Gains)/Losses Excluding Experience Study Effects

JRS and NGNMRS

(\$000's)	JRS			NGNMRS
	<u>Pension</u>	<u>Healthcare</u>	<u>Total</u>	<u>Pension</u>
Liabilities				
- Demographic Experience	(592)	155	(437)	(1,556)
- Salary Increases	(4,581)	n/a	(4,581)	n/a
- COLA Increases	(7,623)	n/a	(7,623)	
- Medical Claims Experience	n/a	(1,843)	(1,843)	n/a
- New Entrants/Rehires	998	318	1,316	0
- Data clean-up	n/a	n/a	n/a	(10,671)
- Modified Part B Only Assumption	n/a	41	41	n/a
- Cadillac Tax Initial Measurement	n/a	233	233	n/a
- Other	(320)	(319)	(639)	0
- Total Liabilities	(12,118)	(1,415)	(13,533)	(12,227)
Assets	3	52	55	680
EGWP - Implementation	n/a	(1,697)	(1,697)	n/a
Actual vs Expected Contributions	18	(786)	(768)	(938)

5. Experience Study Effects

Experience Study Recap

In January 2019, the ARMB adopted new assumptions and methods based on the 4-year experience study for the period July 1, 2013 to June 30, 2017:

- a) new economic and demographic assumptions (all plans)
- b) method used to allocate healthcare Normal Cost and Actuarial Accrued Liability changed from level dollar to level percent of pay (PERS/TRS/JRS)
- c) administrative expense load added to Normal Cost (PERS/TRS/JRS)
- d) 25-year layered amortization of Unfunded Actuarial Accrued Liability (UAAL) starting June 30, 2018 (PERS/TRS DB)
 - Layer #1: Unfunded liability at 6/30/18 using current assumptions/methods, including FY18 experience gain/loss, is amortized over 21 years (the years remaining of the 25-year closed period that started in 2014)
 - Layer #2: Change in unfunded liability at 6/30/18 due to new assumptions/methods and EGWP implementation is amortized over a closed 25-year period
 - Future Layers: Each year's experience gain/loss will be amortized over a closed 25-year period

Effects of New Assumptions/Methods from Experience Study

Pension/Occ D&D

as of June 30, 2018 (\$000's)	PERS	TRS	PERS DCR	TRS DCR	JRS	NGNMRS
Actuarial Accrued Liability						
- Before Changes	14,050,591	7,261,944	8,618	31	216,216	21,778
- After Changes	<u>14,606,033</u>	<u>7,276,290</u>	<u>7,713</u>	<u>30</u>	<u>226,560</u>	<u>22,137</u>
- Increase/(Decrease) - \$	555,442	14,346	(905)	(1)	10,344	359
- Increase/(Decrease) - %	4.0	0.2	(10.5)	(3.2)	4.8	1.6
Normal Cost						
- Before Changes	157,708	60,810	3,870	275	5,639	812
- After Changes	<u>156,862</u>	<u>57,447</u>	<u>4,405</u>	<u>278</u>	<u>6,422</u>	<u>728</u>
- Increase/(Decrease) - \$	(846)	(3,363)	535	3	783	(84)
- Increase/(Decrease) - %	(0.5)	(5.5)	13.8	1.1	13.9	(10.3)

Effects of New Assumptions/Methods from Experience Study

Healthcare

as of June 30, 2018 (\$000's)	PERS	TRS	PERS DCR	TRS DCR	JRS	NGNMRS
Actuarial Accrued Liability						
- Before Changes	7,608,255	2,850,424	132,354	43,056	15,837	n/a
- After Changes	<u>8,368,761</u>	<u>2,931,810</u>	<u>122,712</u>	<u>33,551</u>	<u>18,544</u>	n/a
- Increase/(Decrease) - \$	760,506	81,386	(9,642)	(9,505)	2,707	n/a
- Increase/(Decrease) - %	10.0	2.9	(7.3)	(22.1)	17.1	n/a
Normal Cost						
- Before Changes	60,819	16,969	14,109	3,712	630	n/a
- After Changes	<u>114,907</u>	<u>32,033</u>	<u>14,460</u>	<u>3,326</u>	<u>890</u>	n/a
- Increase/(Decrease) - \$	54,088	15,064	351	(386)	260	n/a
- Increase/(Decrease) - %	88.9	88.8	2.5	(10.4)	41.3	n/a

Note: All figures shown on this slide *exclude* EGWP effects.

Effects of New Assumptions/Methods from Experience Study

Total

as of June 30, 2018 (\$000's)	PERS	TRS	PERS DCR	TRS DCR	JRS	NGNMRS
Actuarial Accrued Liability						
- Before Changes	21,658,846	10,112,368	140,972	43,087	232,053	21,778
- After Changes	<u>22,974,794</u>	<u>10,208,100</u>	<u>130,425</u>	<u>33,581</u>	<u>245,104</u>	<u>22,137</u>
- Increase/(Decrease) - \$	1,315,948	95,732	(10,547)	(9,506)	13,051	359
- Increase/(Decrease) - %	6.1	0.9	(7.5)	(22.1)	5.6	1.6
Normal Cost						
- Before Changes	218,527	77,779	17,979	3,987	6,269	812
- After Changes	<u>271,769</u>	<u>89,480</u>	<u>18,865</u>	<u>3,604</u>	<u>7,312</u>	<u>728</u>
- Increase/(Decrease) - \$	53,242	11,701	886	(383)	1,043	(84)
- Increase/(Decrease) - %	24.4	15.0	4.9	(9.6)	16.6	(10.3)

Note: All figures shown on this slide *exclude* EGWP effects.

6. Development of Per Capita Claims Costs

Development of Per Capita Claims Costs

1. In setting the per capita costs for the 6/30/18 valuations, historical claims experience was provided by the State of Alaska, with review by Segal
2. Reports were generated from the data warehouse to provide an allocation of claims split between pre-Medicare and Medicare-eligible participants
3. In reviewing the reports, Segal discovered that audio and vision claims were incorrectly included in the reports that were provided to us for the 6/30/17 valuations
 - a) Those claims accounted for approximately \$9.9M during fiscal 2017 (less than 2% of gross claims totaling \$529.7M)
 - b) Accounting for other changes, the net impact is that fiscal 2017 claims are lower by \$7.2M
 - c) These revised fiscal 2017 claims were used in this year's claims cost development

Development of Per Capita Claims Costs (cont'd)

	6/30/17 Valuation		6/30/18 Valuation		6/30/17 Valuation		6/30/18 Valuation	
	Medical		Medical		Prescription Drug		Prescription Drug	
	Pre-Medicare	Medicare A&B	Pre-Medicare	Medicare A&B	Pre-Medicare	Medicare	Pre-Medicare	Medicare
A. Fiscal 2016								
1. Incurred Claims	\$ 237,116,614	\$ 65,703,369			\$ 61,130,319	\$ 132,941,507		
2. Average Enrollment	24,439	36,151			24,439	36,151		
3. Claim Cost Rate (1) / (2)	\$ 9,702	\$ 1,817			\$ 2,501	\$ 3,677		
4. Claim Cost Rate Trended to Valuation Year	\$ 10,929	\$ 1,999			\$ 2,882	\$ 4,237		
B. Fiscal 2017								
1. Incurred Claims*	\$ 231,784,641	\$ 71,323,054	\$ 230,671,216	\$ 66,265,130	\$ 57,014,282	\$ 142,148,548	\$ 56,709,245	\$ 141,466,082
2. Average Enrollment	23,342	38,502	23,342	38,502	23,342	38,502	23,342	38,502
3. Claim Cost Rate (1) / (2)	\$ 9,930	\$ 1,852	\$ 9,882	\$ 1,721	\$ 2,443	\$ 3,692	\$ 2,430	\$ 3,674
4. Claim Cost Rate Trended to Valuation Year	\$ 10,574	\$ 1,799	\$ 11,230	\$ 1,870	\$ 2,580	\$ 3,902	\$ 2,787	\$ 4,214
C. Fiscal 2018								
1. Incurred Claims			\$ 228,572,782	\$ 72,875,570			\$ 57,558,136	\$ 157,311,819
2. Average Enrollment			21,920	40,560			21,920	40,560
3. Claim Cost Rate (1) / (2)			\$ 10,428	\$ 1,797			\$ 2,626	\$ 3,878
4. Claim Cost Rate Trended to Valuation Year			\$ 11,074	\$ 1,869			\$ 2,836	\$ 4,189
D. Claim Cost Rate Percentage Increase								
1. Percentage Increase	2.3%	1.9%	5.5%	4.4%	-2.3%	0.4%	8.1%	5.6%
B(3) / A(3) for Fiscal 2016 to Fiscal 2017								
C(3) / B(3) for Fiscal 2017 to Fiscal 2018								

* Claims for the two valuations differ primarily because the reports from HDMS for the June 30, 2017 valuation incorrectly included audio and vision claims which were excluded for the June 30, 2018 valuation

Development of Per Capita Claims Costs (cont'd)

1. Per capita claims costs for fiscal 2019 are lower than expected compared to the corresponding amounts from the 6/30/17 valuations
2. Below is a comparison of the expected fiscal 2019 per capita costs based on the 6/30/17 valuations with the corresponding figures developed from updated data (using the morbidity assumption from the 6/30/17 valuations)

	Medical			Prescription Drugs (Rx)		
	Pre-Medicare	Medicare Parts A & B	Medicare Part B Only	Pre-Medicare	Medicare	RDS
1. Fiscal 2018 age 65 per capita cost	13,682	1,485	4,722	3,493	3,706	659
2. Fiscal 2018 trend rate	8.00%	5.50%	5.50%	9.00%	9.00%	6.50%
3. Expected Fiscal 2019 age 65 per capita cost (1) x (1 + (2))	14,777	1,567	4,982	3,807	4,040	702
4. Actual Fiscal 2019 age 65 per capita cost	14,162	1,404	4,464	3,593	3,813	534
5. Percentage (Gain) / Loss (4) / (5) - 1	(4.2%)	(10.4%)	(10.4%)	(5.6%)	(5.6%)	(23.9%)

Development of Per Capita Claims Costs – Change in Morbidity

1. The morbidity assumption is being updated as part of the experience study completed during 2018
2. Impact on the fiscal 2019 age 65 per capita cost due to the change in morbidity assumption:

	Medical			Prescription Drugs (Rx)		
	Pre-Medicare	Medicare Parts A & B	Medicare Part B Only	Pre-Medicare	Medicare	RDS
1. Valuation per capita cost at average age	11,152	1,836	5,839	2,811	4,201	588
Morbidity						
2. Current average aging factor	0.787	1.308	1.308	0.782	1.102	1.102
3. New average aging factor	0.824	1.251	1.251	0.837	1.116	1.116
Age 65 Cost						
4. Current average aging factor (1) / (2)	14,162	1,404	4,464	3,593	3,813	534
5. New average aging factor (1) / (3)	13,535	1,468	4,667	3,360	3,764	527
6. Impact of new morbidity (5) / (4) – 1	(4.4%)	4.5%	4.5%	(6.5%)	(1.3%)	(1.3%)

7. Medicare Part B Only Participants

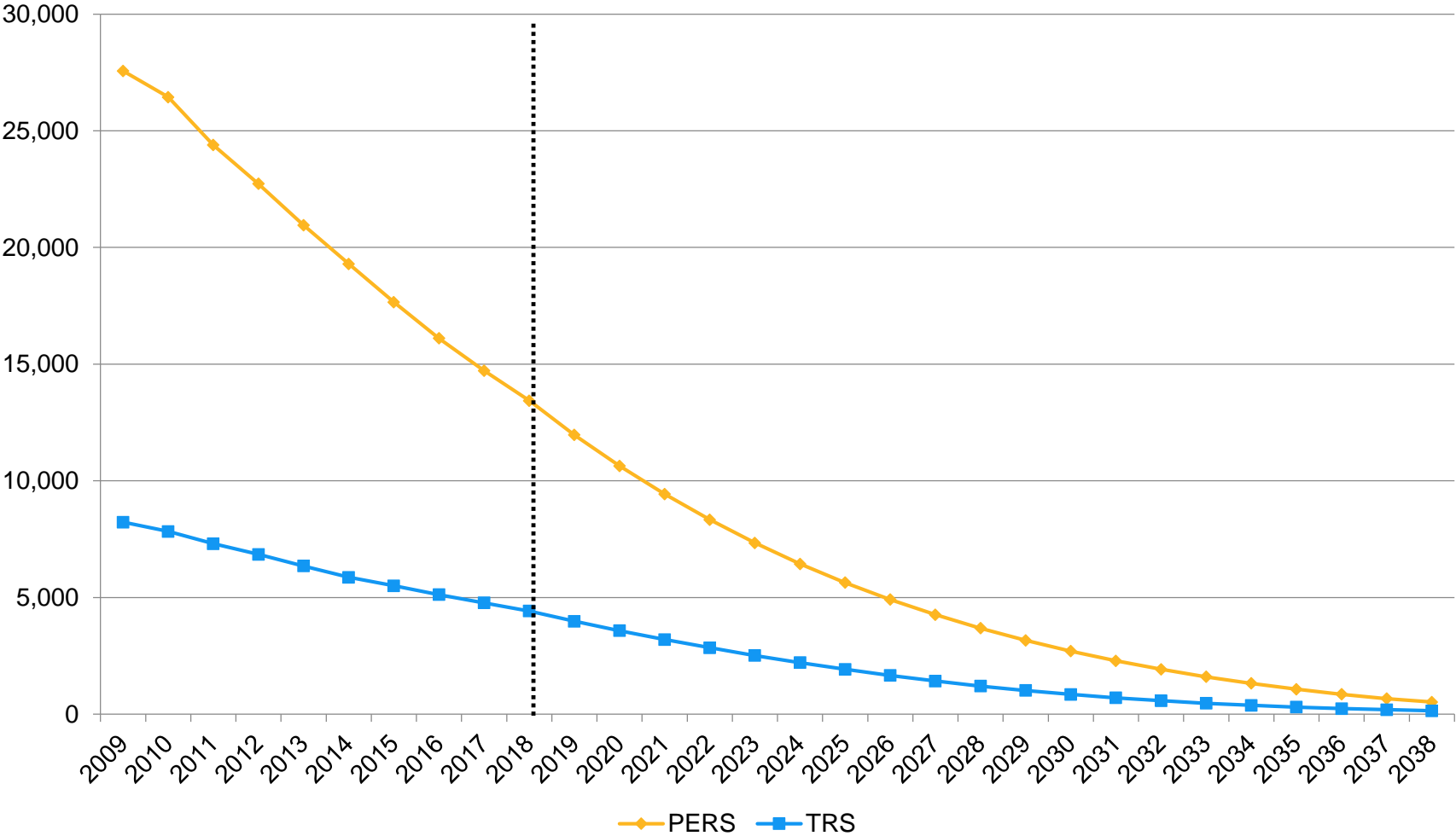
Medicare Part B Only Participants

1. Certain retirees are not eligible for Medicare Part A (e.g. those hired before April 1, 1986 who were exempt from paying FICA and, therefore not subject to mandatory Medicare coverage, or those who don't otherwise have enough quarters of coverage to qualify for free Medicare Part A coverage). These retirees are only eligible for Medicare Part B.
2. Less than 1% of current Medicare-eligible retirees are currently in this situation
3. As a result, the State of Alaska will pay medical costs for these retirees who would otherwise be covered by Medicare Part A
4. Aetna has provided a file for the past two years indicating between 1% - 2% of participants turning age 65 were not eligible for Medicare Part A
5. Previous valuations used pension hire and re-hire dates to estimate who would not be eligible for Part A. The last two years of actual data from Aetna have shown that the methodology used in previous valuations was overestimating the number of participants in this situation.
6. Therefore, we updated the methodology by assuming 5% of non-Medicare retired and terminated vested participants will not be eligible for Medicare Part A
 - a) Impact on the 6/30/18 healthcare Actuarial Accrued Liability is less than 1% for TRS, and a little more than 2% for PERS (more people in PERS are affected by this change)
 - b) GRS agreed that this change in methodology is reasonable

8. Membership Counts (Historical and Projected)

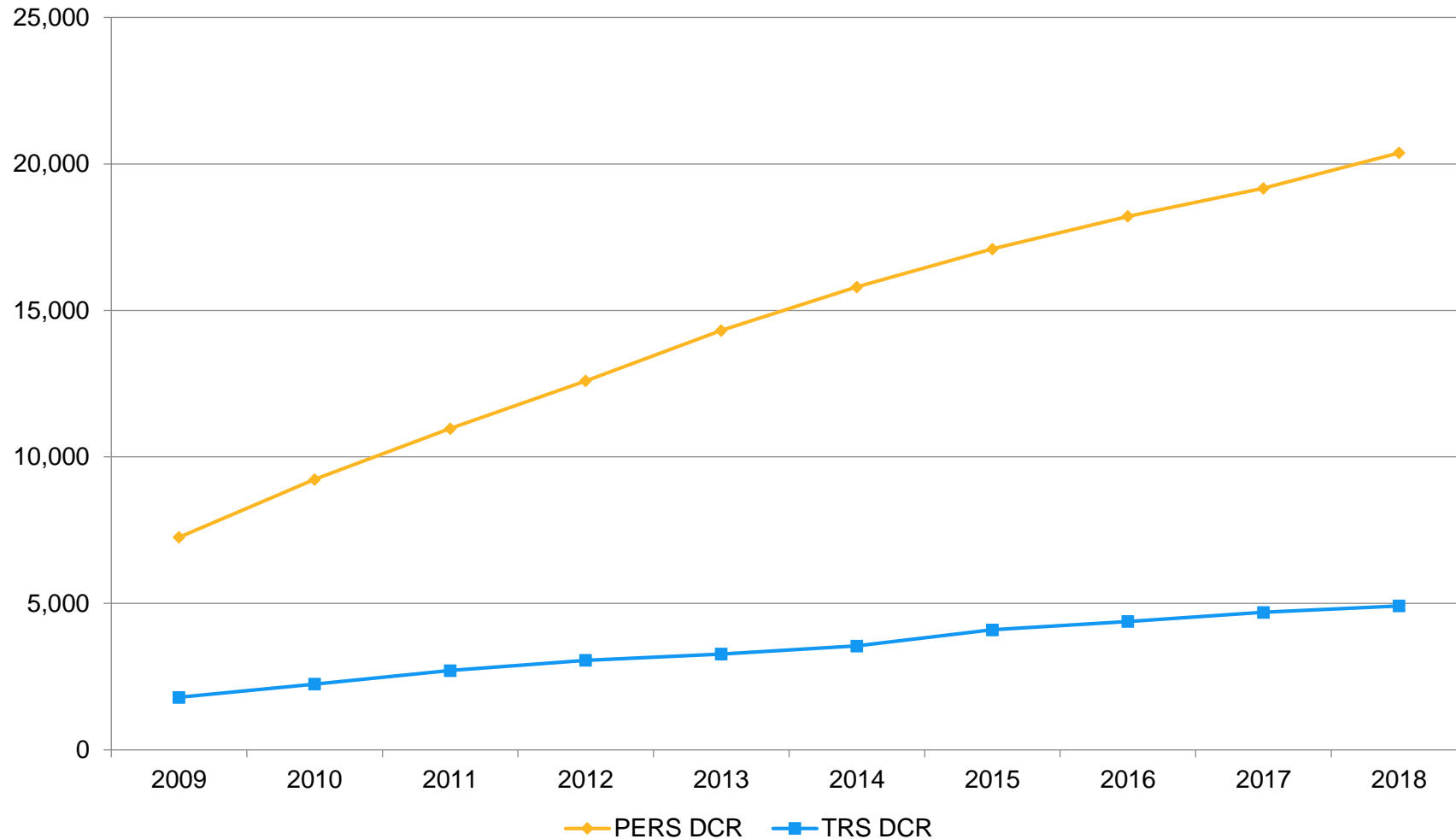
Active Counts – Historical and Projected

PERS DB & TRS DB



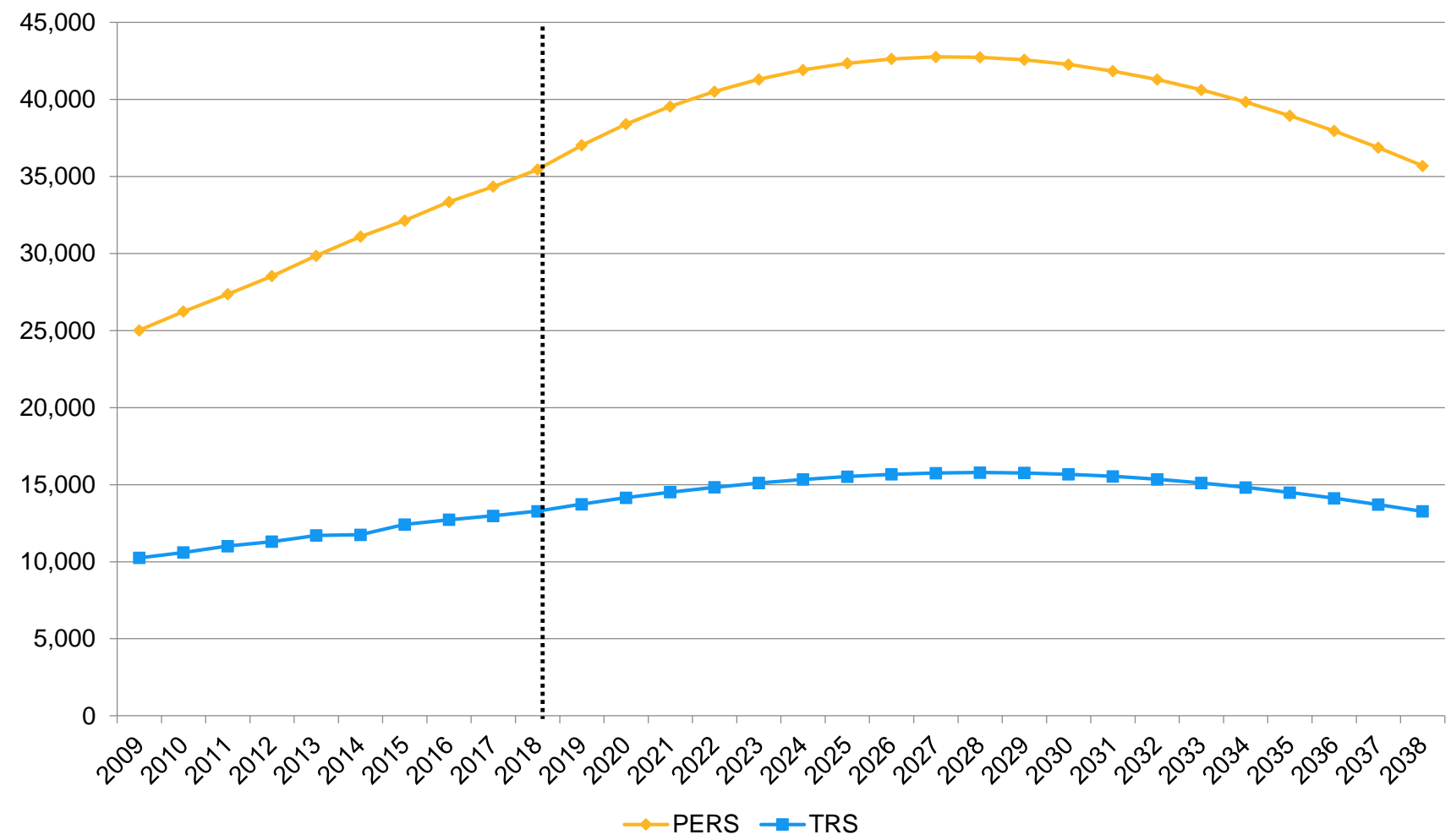
Active Counts – Historical

PERS DCR & TRS DCR



Retiree Counts – Historical and Projected

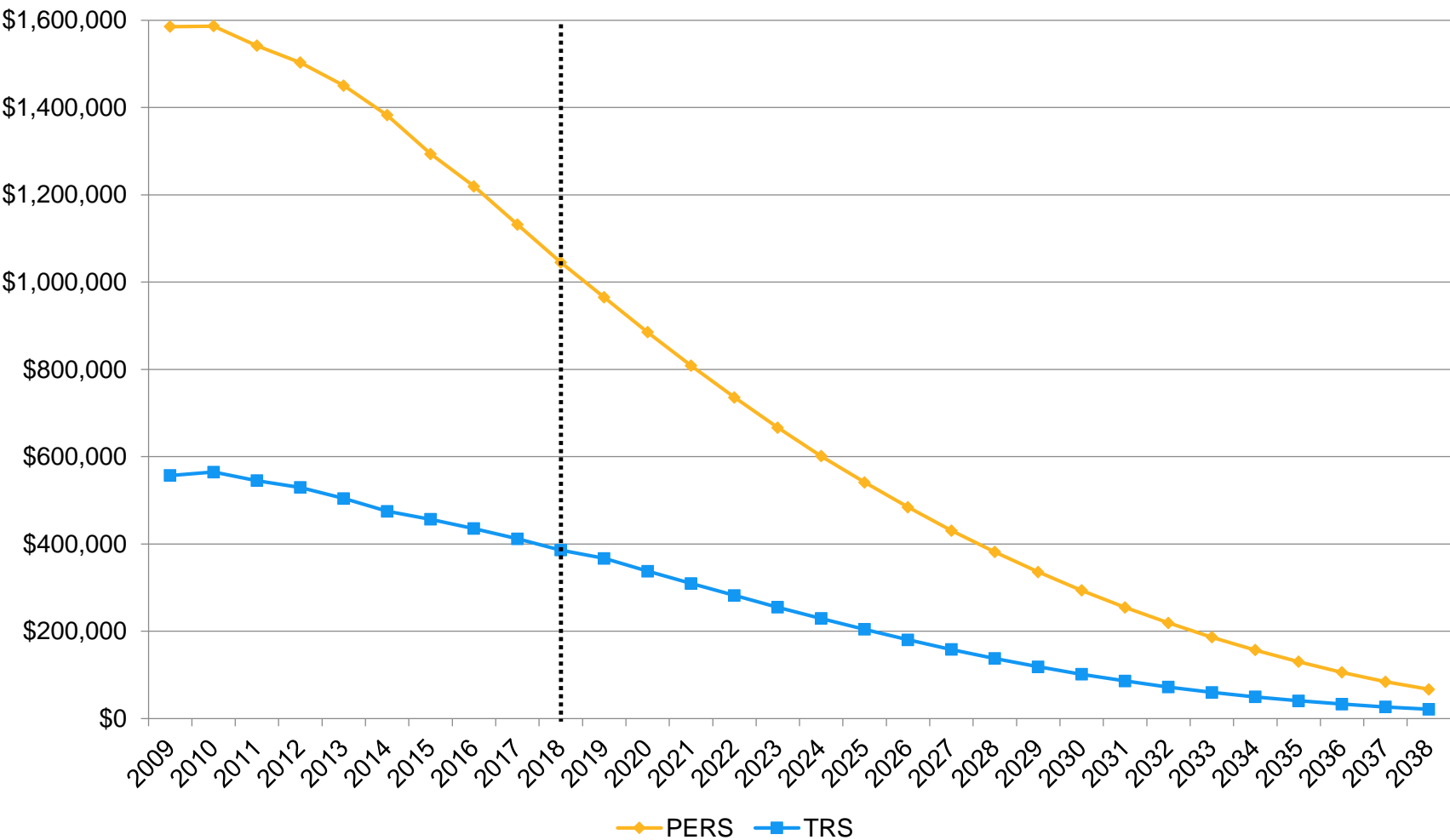
PERS DB & TRS DB



9. Payroll (Historical and Projected)

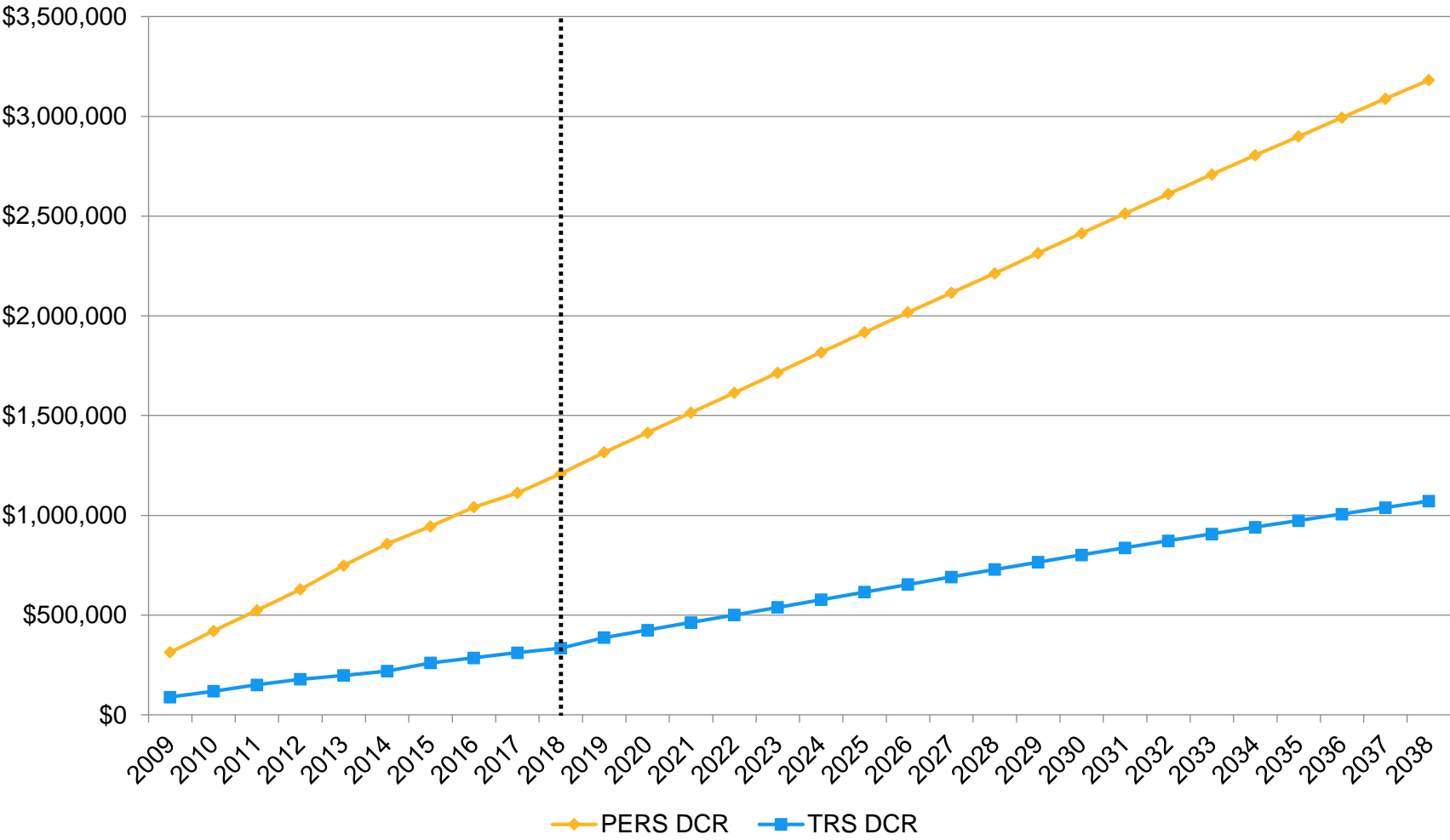
Total Active Payroll – Historical and Projected

PERS DB & TRS DB (in 000's)



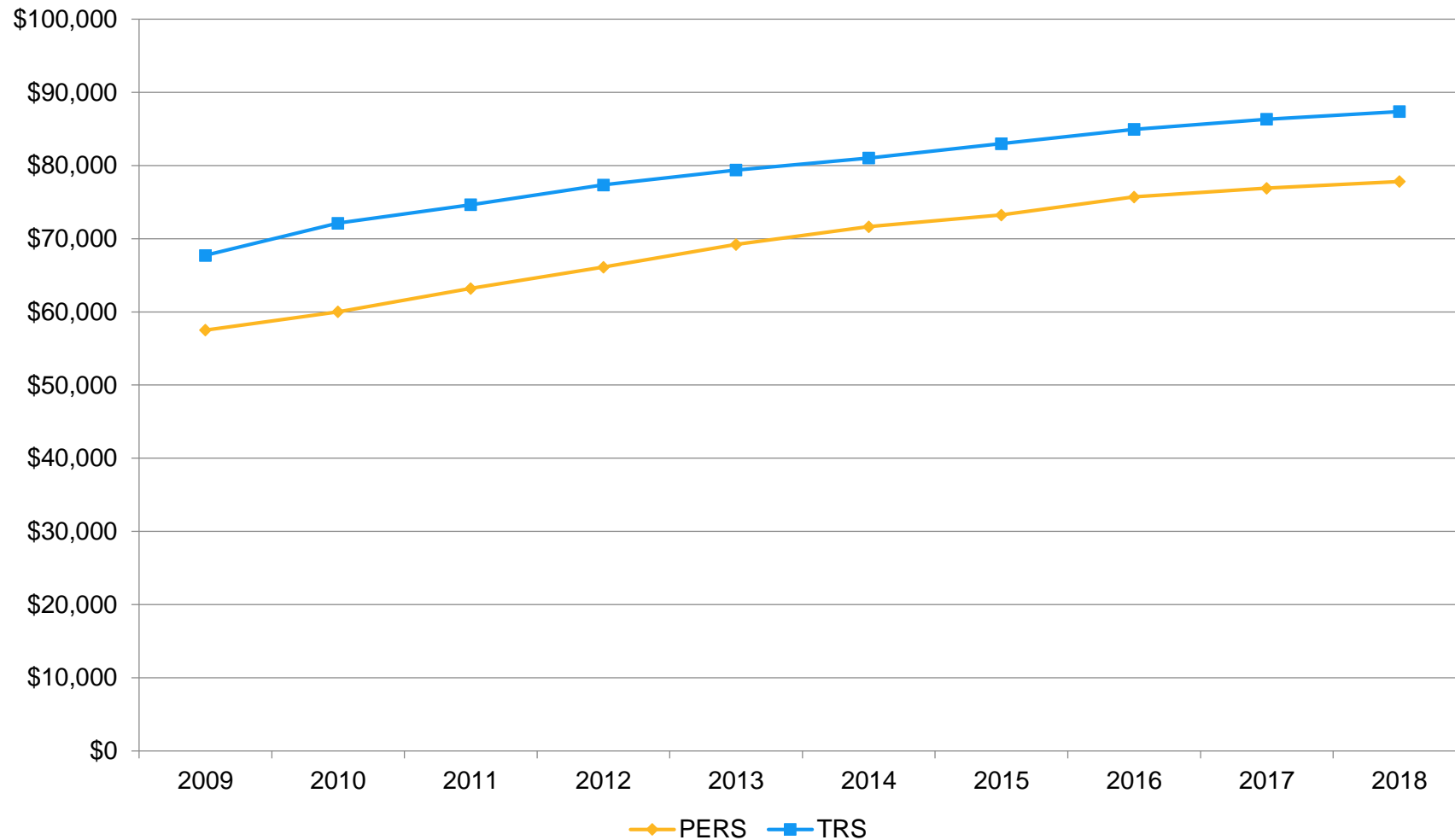
Total Active Payroll – Historical and Projected

PERS DCR & TRS DCR (in 000's)



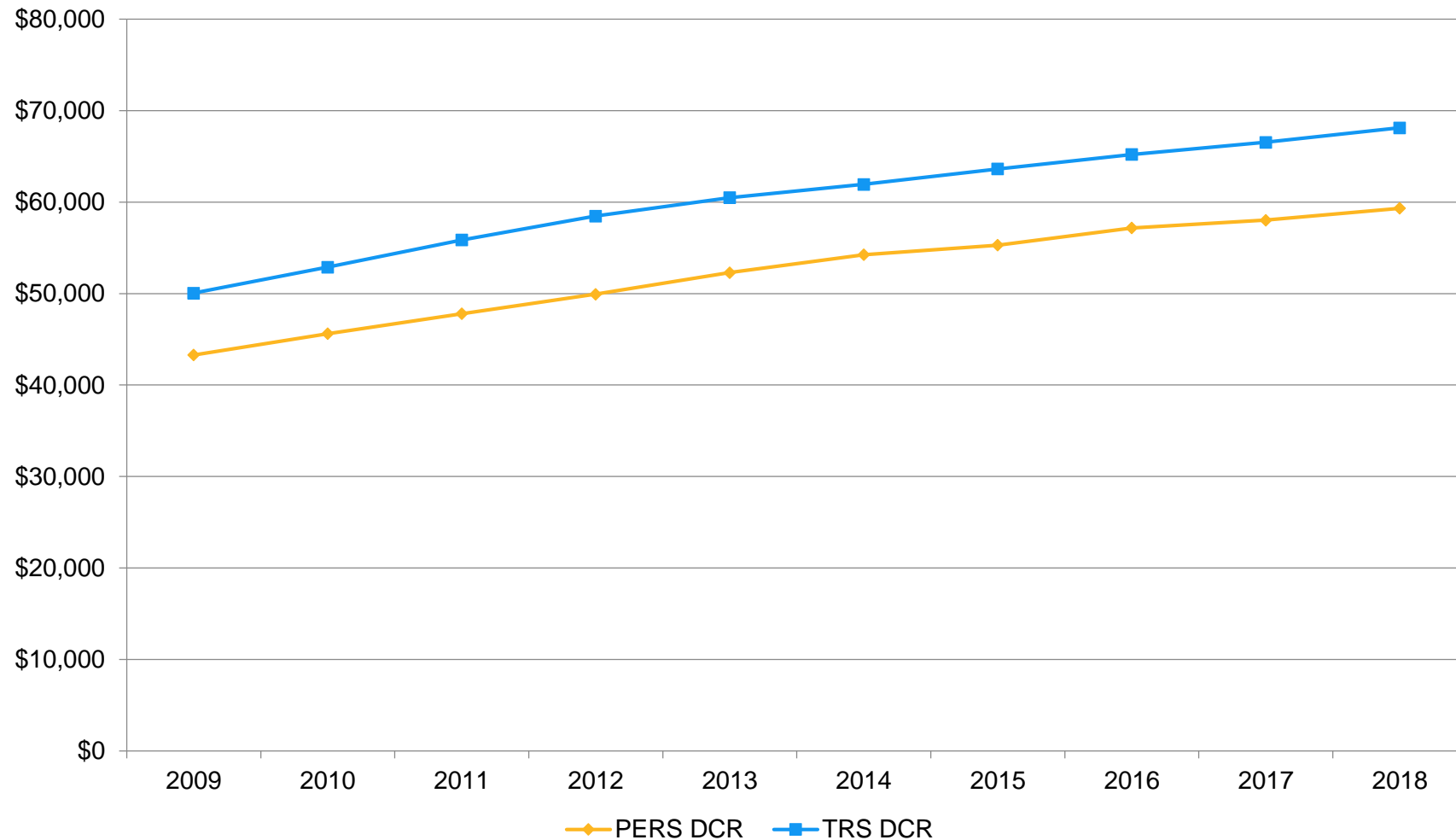
Average Active Pay – Historical

PERS DB & TRS DB



Average Active Pay – Historical

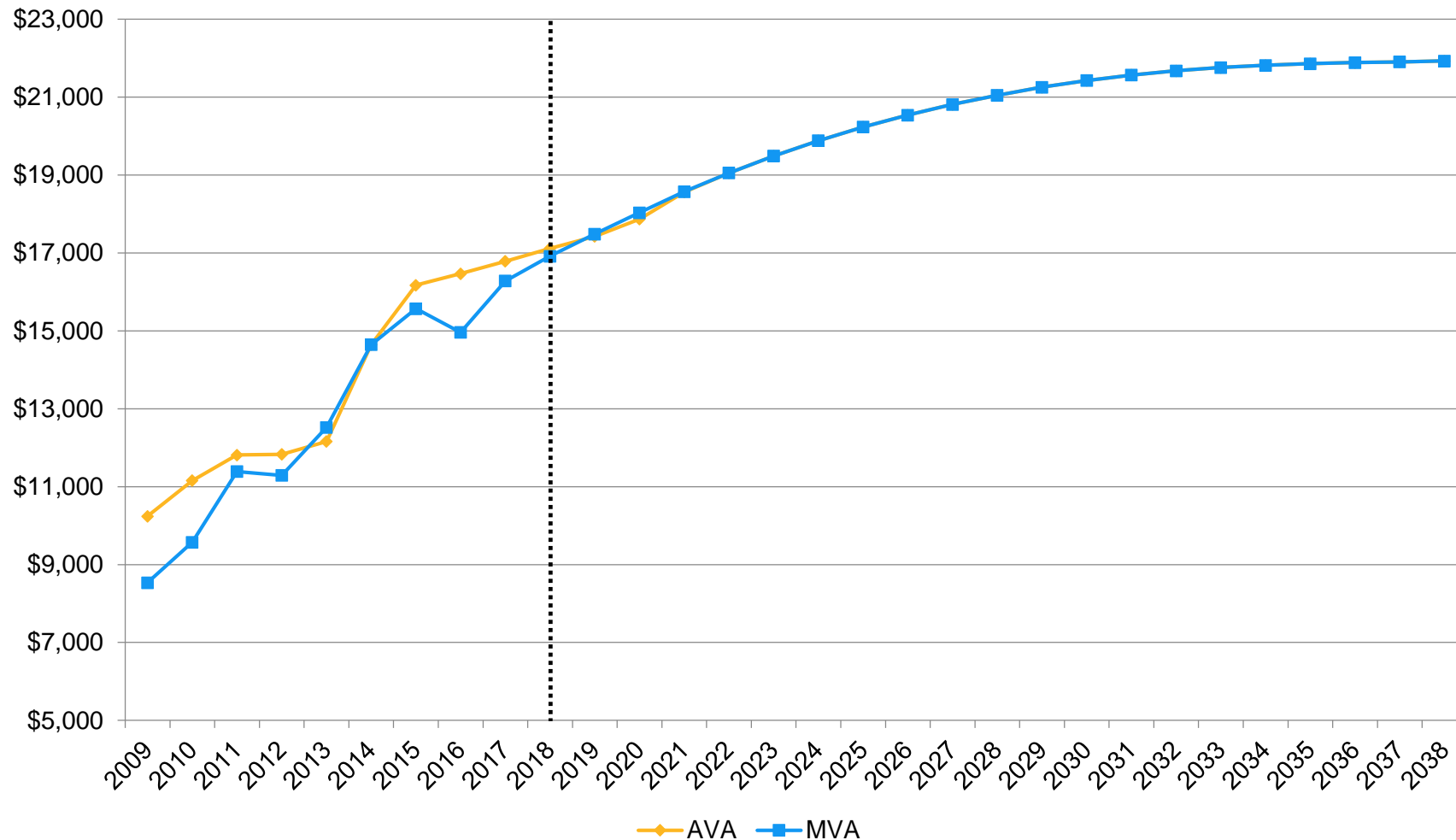
PERS DCR & TRS DCR



10. Asset Values (Historical and Projected)

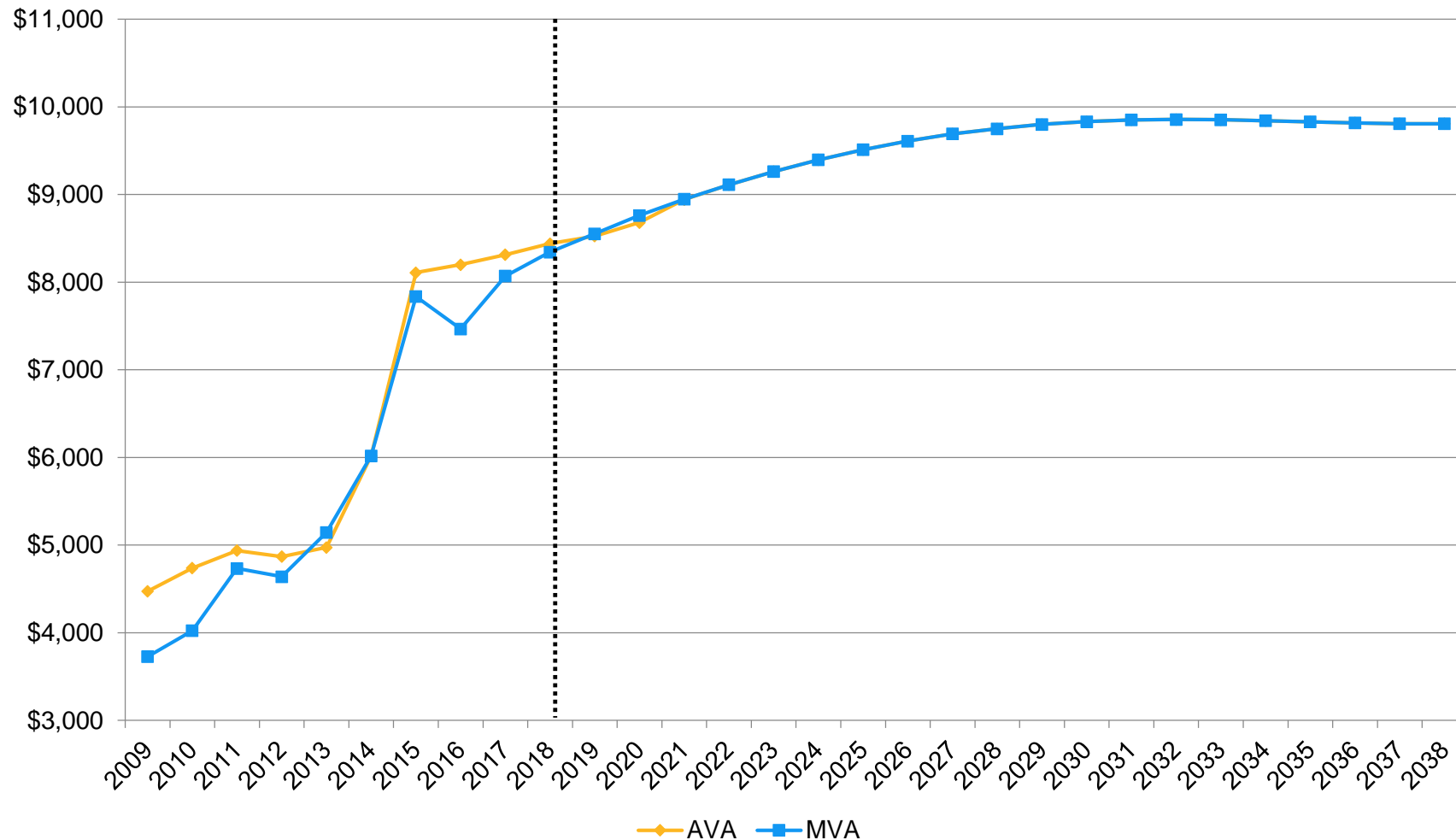
Actuarial Value vs Market Value of Assets – Historical and Projected

PERS DB (in millions)



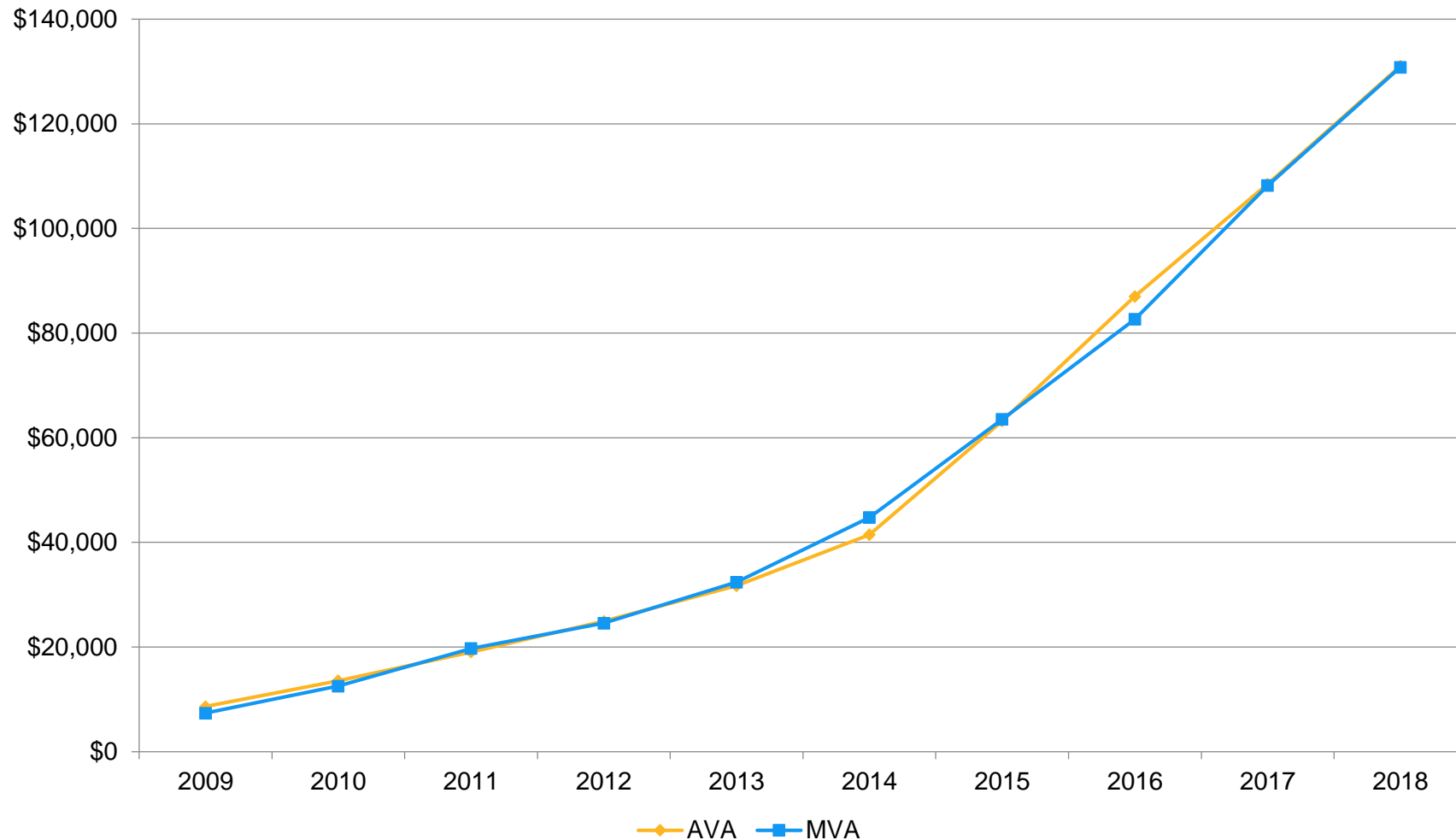
Actuarial Value vs Market Value of Assets – Historical and Projected

TRS DB (in millions)



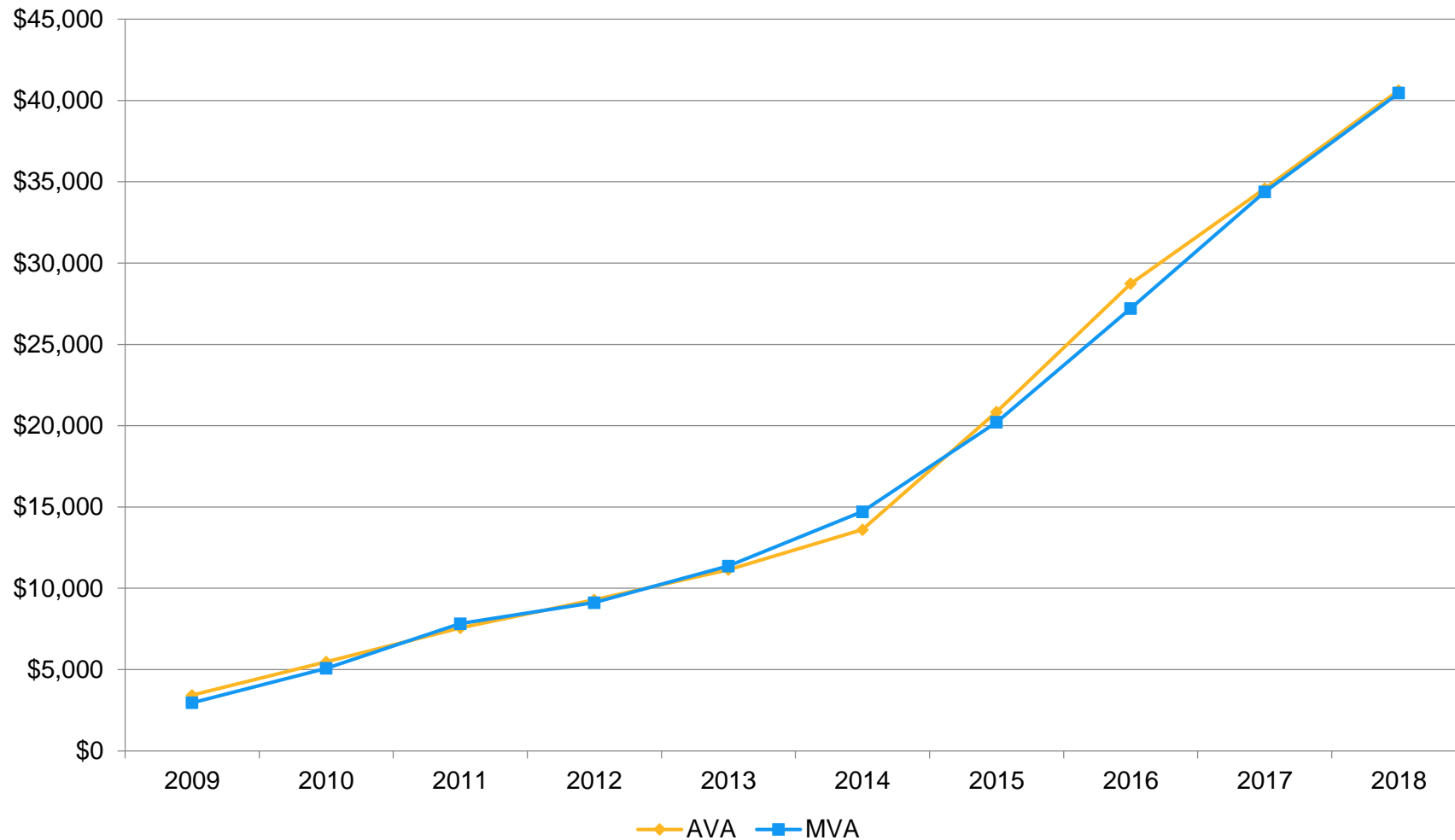
Actuarial Value vs Market Value of Assets – Historical

PERS DCR (in 000's)



Actuarial Value vs Market Value of Assets – Historical

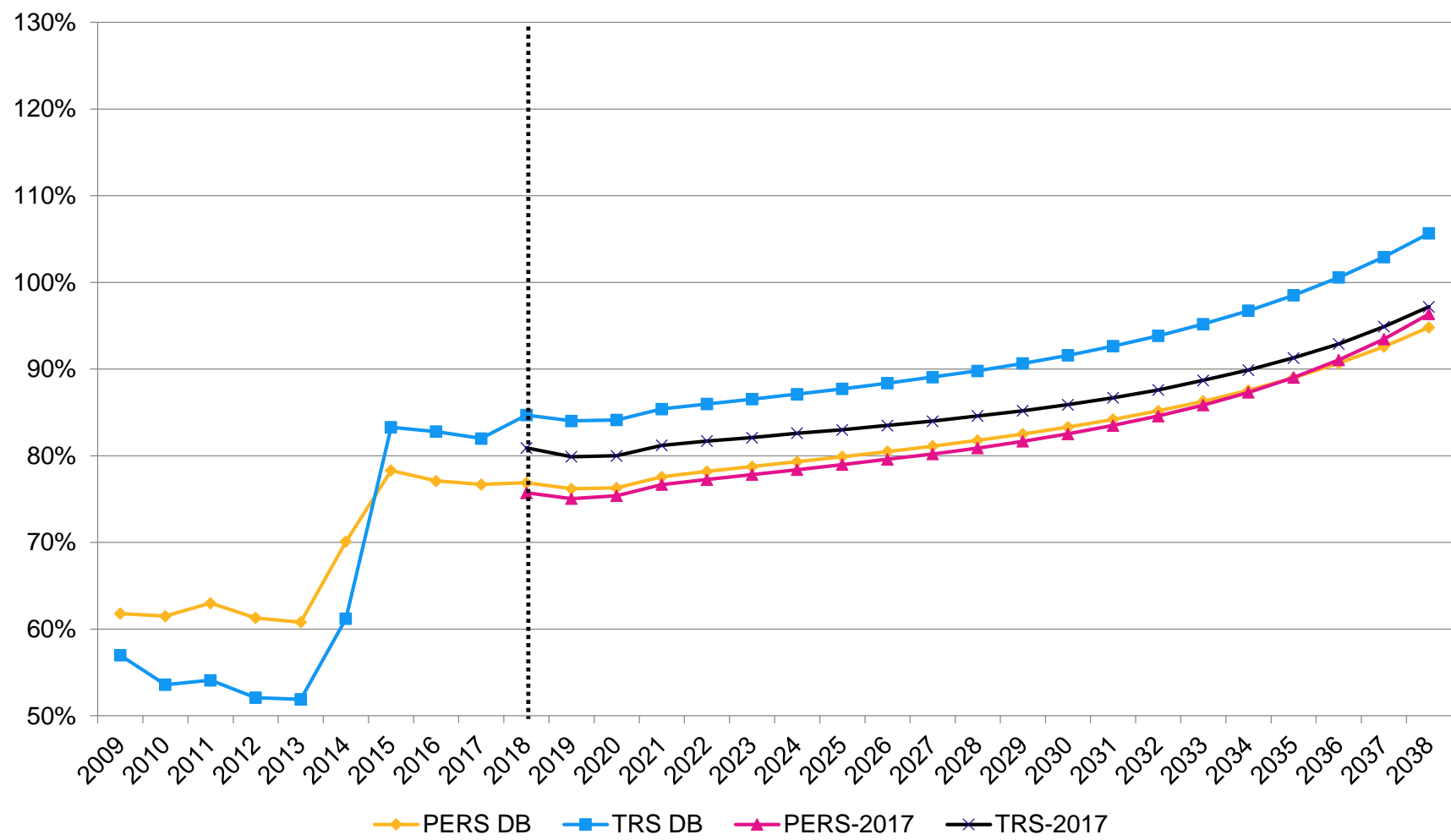
TRS DCR (in 000's)



11. Funded Ratios (AVA) (Historical and Projected)

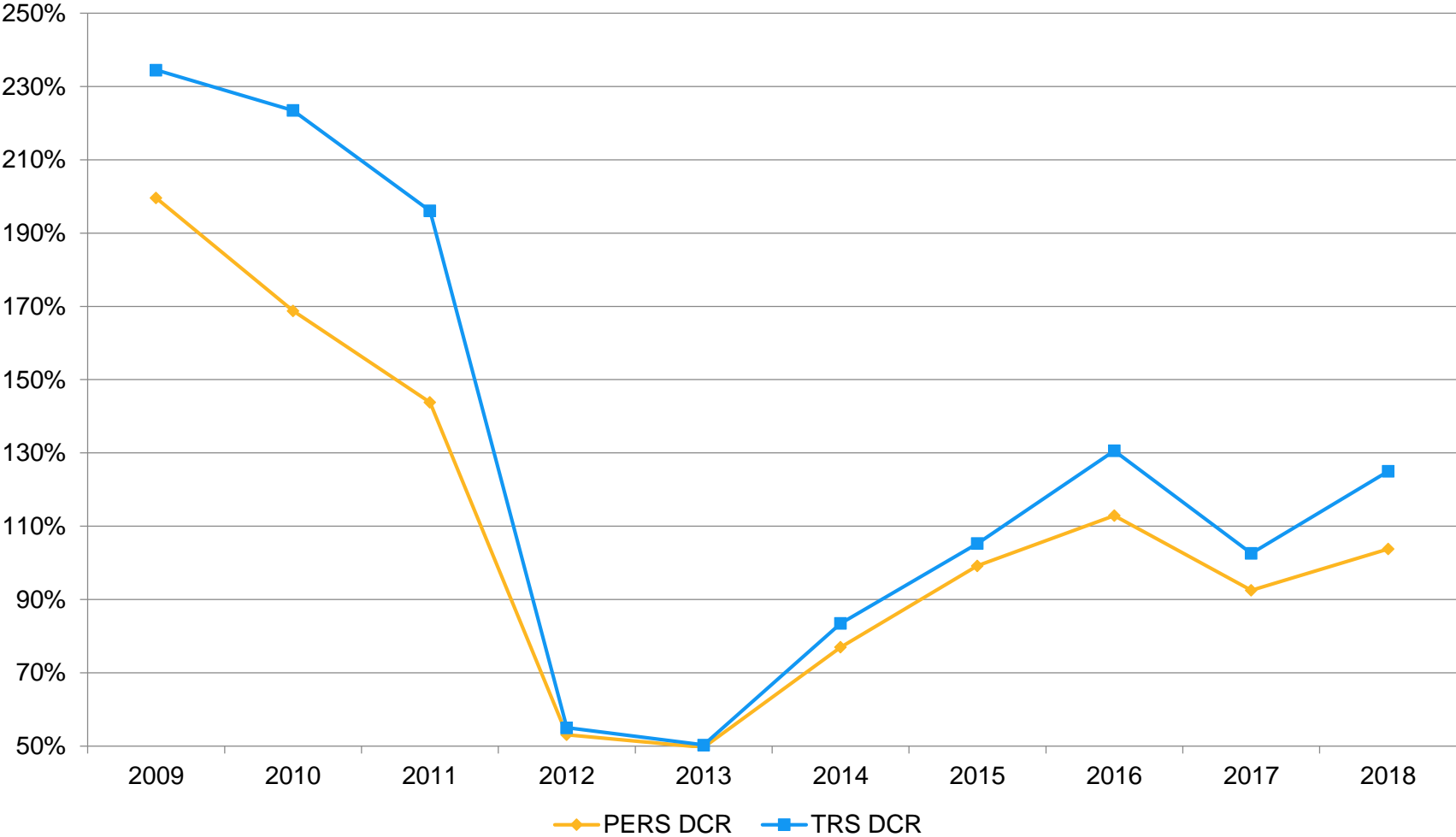
Funded Ratios (AVA) – Historical and Projected

PERS DB & TRS DB



Funded Ratios (AVA) – Historical

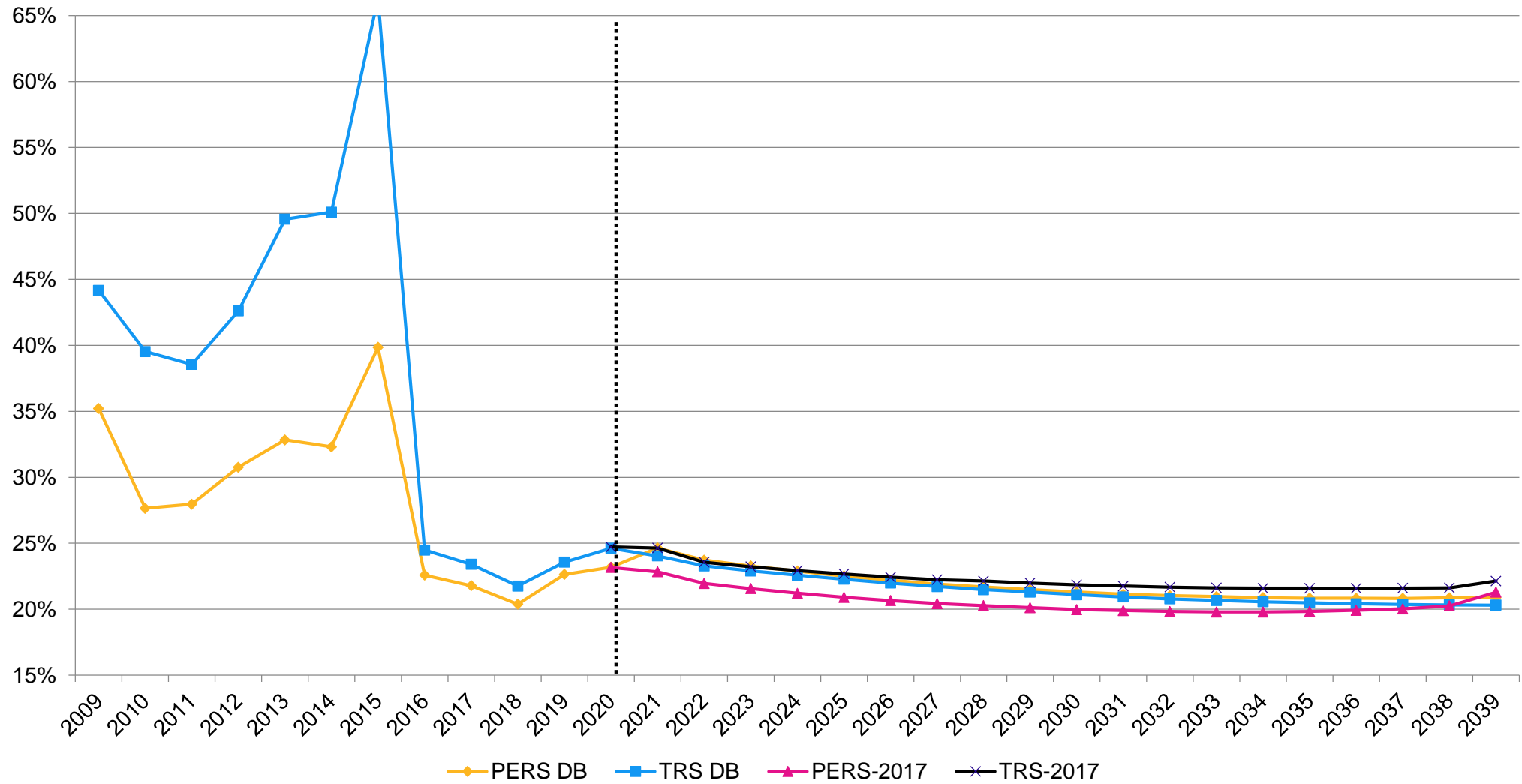
PERS DCR & TRS DCR



12. Contribution Rates (Historical and Projected)

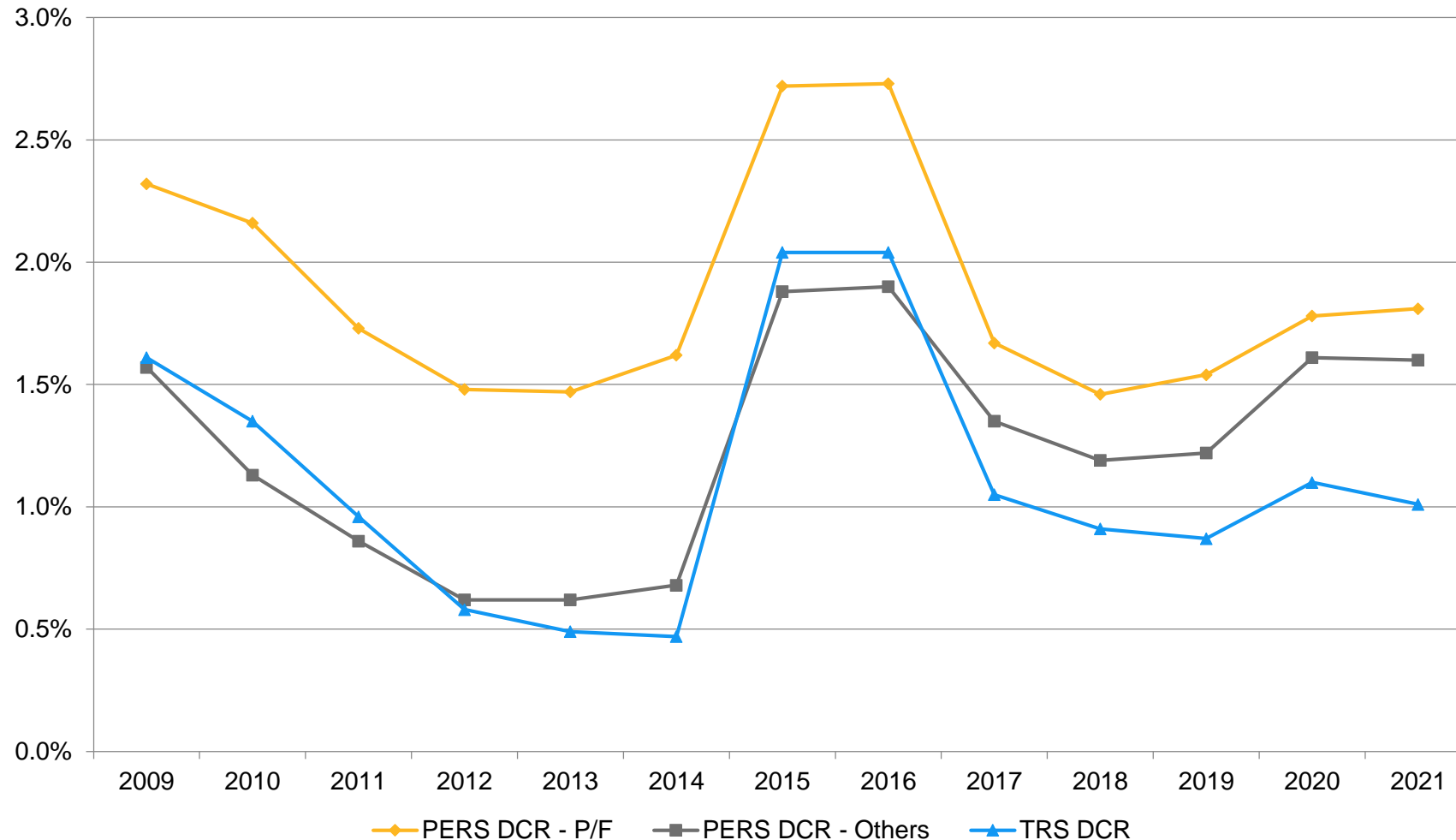
Contribution Rates by Fiscal Year – Historical and Projected

PERS DB & **TRS DB** (as % of DB/DCR Pay)



Contribution Rates by Fiscal Year – Historical

PERS DCR - P/F, PERS DCR - Others, TRS DCR (as % of DCR Pay)



13. Additional State Contributions (Projected)

Additional State Contributions (in \$000's)

Fiscal Year	PERS	TRS	PERS-2017	TRS-2017
2021	196,914	132,715	162,928	148,487
2022	185,911	132,153	153,047	147,022
2023	185,255	134,424	154,760	151,497
2024	186,254	137,162	157,691	156,430
2025	187,213	140,162	161,294	161,559
2026	189,574	143,219	166,167	167,032
2027	191,637	146,605	171,847	172,849
2028	195,602	150,025	179,245	179,635
2029	199,585	154,000	186,654	186,114
2030	204,346	157,842	194,344	192,782
2031	209,060	161,879	204,009	199,901
2032	215,053	166,046	213,786	207,288
2033	221,605	170,515	224,757	215,178
2034	228,140	175,116	237,367	223,373
2035	235,774	179,819	251,280	232,026
2036	243,599	184,599	267,124	240,685
2037	251,693	189,573	284,569	249,985
2038	261,094	194,748	306,776	259,374
2039	269,649	200,215	365,504	275,918
Total	4,057,958	3,050,817	4,043,149	3,767,135

Notes:

1. Stable active population on combined DB/DCR basis assumed throughout the projection period.
2. No actuarial gains/losses assumed after 6/30/18.
3. Actual FY21 contribution amounts will reflect FY19 asset performance.
4. Rehire assumption in 6/30/18 valuation assumed to grade uniformly to 0% over 20 years.
5. "PERS-2017" and "TRS-2017" are based on 6/30/17 valuation data, results, and assumptions/methods.

14. Actuarial Certification

Actuarial Certification

The purpose of this presentation is to provide the Actuarial Committee and ARMB with June 30, 2018 valuation results for discussion at the June 19 & 20, 2019 meetings. This presentation should be considered part of the June 30, 2018 actuarial valuation services.

The data, assumptions, methods, and plan provisions used to determine the results shown in this presentation are as shown in the June 30, 2018 actuarial valuation reports, which will be provided within the next few weeks (for projections, the rehire assumption in the June 30, 2018 valuation is assumed to grade uniformly to 0% over 20 years). “PERS-2017” and “TRS-2017” figures on slides 44, 47 and 50 are based on June 30, 2017 valuation data, results, and assumptions/methods.

Where presented, references to “funded ratio” and “unfunded actuarial accrued liability” typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded actuarial accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions, but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e., purchase annuities) all or a portion of its liabilities.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law.

The results were prepared under the direction of David Kershner and Scott Young, both of whom meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. These results have been prepared in accordance with all applicable Actuarial Standards of Practice.

David Kershner
FSA, EA, MAAA, FCA
Principal, Retirement

Scott Young
FSA, EA, MAAA
Director, Health



State of Alaska - Additional State Contributions (\$000's)

Fiscal Year	PERS		TRS	
	Amount	Change From Previous Year	Amount	Change From Previous Year
2010	107,953	n/a	173,462	n/a
2011	165,841	57,888	190,850	17,388
2012	242,610	76,769	234,517	43,667
2013	307,302	64,692	302,777	68,260
2014	312,473	5,171	316,846	14,069
2015	1,000,000	687,527	2,000,000	1,683,154
2016	126,521	(873,479)	130,108	(1,869,892)
2017	99,167	(27,354)	116,700	(13,408)
2018	72,719	(26,448)	111,757	(4,943)
2019	135,219	62,500	128,174	16,417
2020	159,055	23,836	141,129	12,955
2021	196,914	37,859	131,811	(9,318)
2022	185,911	(11,003)	131,161	(650)
2023	185,255	(656)	133,419	2,258
2024	186,254	999	136,141	2,722
2025	187,212	959	139,126	2,985
2026	189,573	2,360	142,166	3,040
2027	191,637	2,065	145,533	3,367
2028	195,856	4,218	148,935	3,402
2029	199,585	3,729	152,802	3,867
2030	204,346	4,762	156,619	3,817
2031	209,331	4,984	160,719	4,100
2032	215,330	6,000	164,769	4,050
2033	221,322	5,992	169,208	4,439
2034	228,140	6,818	173,778	4,570
2035	235,774	7,634	178,449	4,671
2036	243,599	7,824	183,196	4,747
2037	251,692	8,093	188,136	4,940
2038	260,777	9,085	193,169	5,033
2039	269,649	8,872	198,704	5,535

Notes:

- 1 FY10 thru FY19 are actual amounts contributed.
- 2 FY20 is based on amounts adopted by ARMB in Sept 2018, with 100% assumed to go to pension trusts.
- 3 FY21-FY39 are based on 2018 valuation projections, assuming
(i) no gains/losses after 6/30/18; (ii) stable active population on combined DB/DCR basis in all future years; (iii) rehire assumption in 6/30/18 valuation grades to 0% uniformly over 20 years.
- 4 Actual FY21 amounts will reflect FY19 asset performance.

June 20, 2019



ARMB Board Meeting

Investment Performance
Periods Ended March 31, 2019

Steve Center, CFA
Senior Vice President

Paul Erlendson
Senior Vice President

Agenda

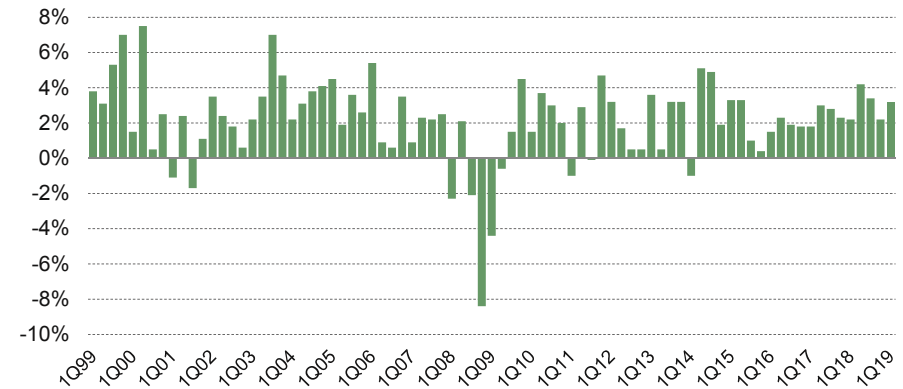
- Market and Economic Environment
- Total Fund Performance
 - Major Asset Classes

U.S. Economy

March 31, 2019

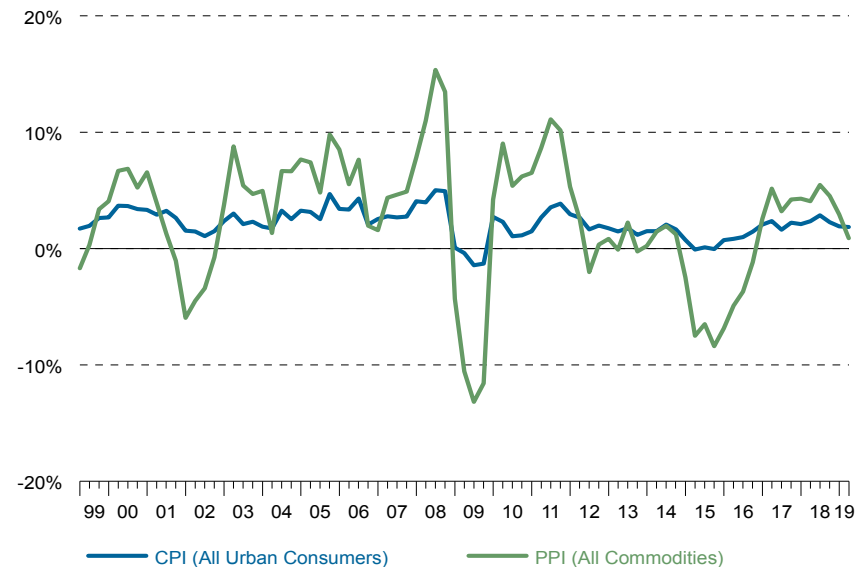
- The final revision of fourth quarter GDP growth came in at 2.2% (annualized)
 - This figure is down from 3.4% in the third quarter, and revised 40 basis points lower from the prior estimate
 - Consumer spending climbed 2.5% (annualized); down from a strong 3.5% in Q3
- Labor market remains healthy, but volatile
 - On average, over 175,000 jobs were added on a monthly basis in the first quarter. However, job growth was highly inconsistent; reaching a high in January of over 300,000 jobs and a low in February of 33,000
 - Unemployment registered at a healthy 3.8% in March
- Moderate inflation
 - As of March, the CPI rose 1.9% over the trailing 12 months, while core CPI grew 2.0% over the same period
- The Fed has provided more dovish guidance for 2019
 - The Federal Funds target range remains at 2.25% to 2.50%
 - The Fed indicated that is unlikely to raise rates in 2019 and plans to end quantitative tightening in September, earlier than previously expected

Quarterly Real GDP Growth (20 Years)



Source: Bureau of Economic Analysis

Inflation Year-Over-Year

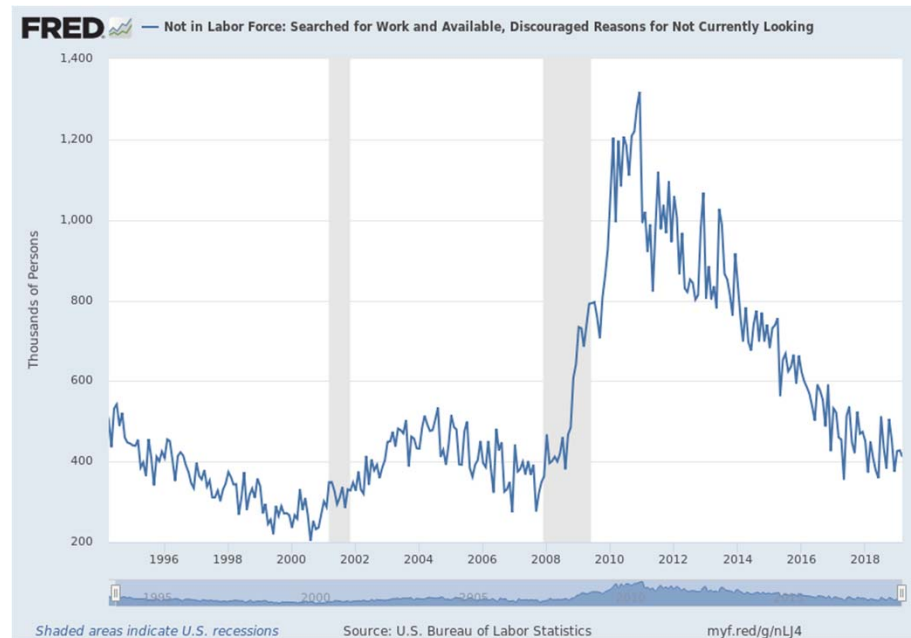


Source: Bureau of Labor Statistics

When Will Inflation Catch Fire? The Job Market Squeeze on Policy

10 years of persistent monetary and fiscal stimulus has caught up to global growth

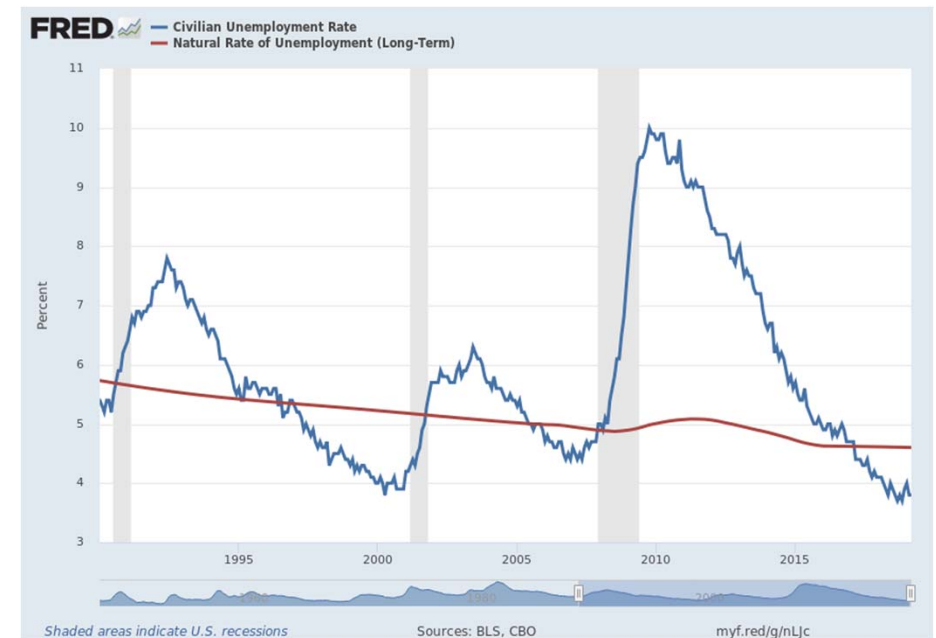
Discouraged Workers – Not In Labor Force



Discouraged worker effect has been pervasive since the Global Financial Crisis

- Gradual, persistent economic growth has finally coaxed workers back from the sidelines, erasing the slack in the job market.

Actual and Natural Rates of Unemployment (%)



The U.S. unemployment rate has reached a generational low

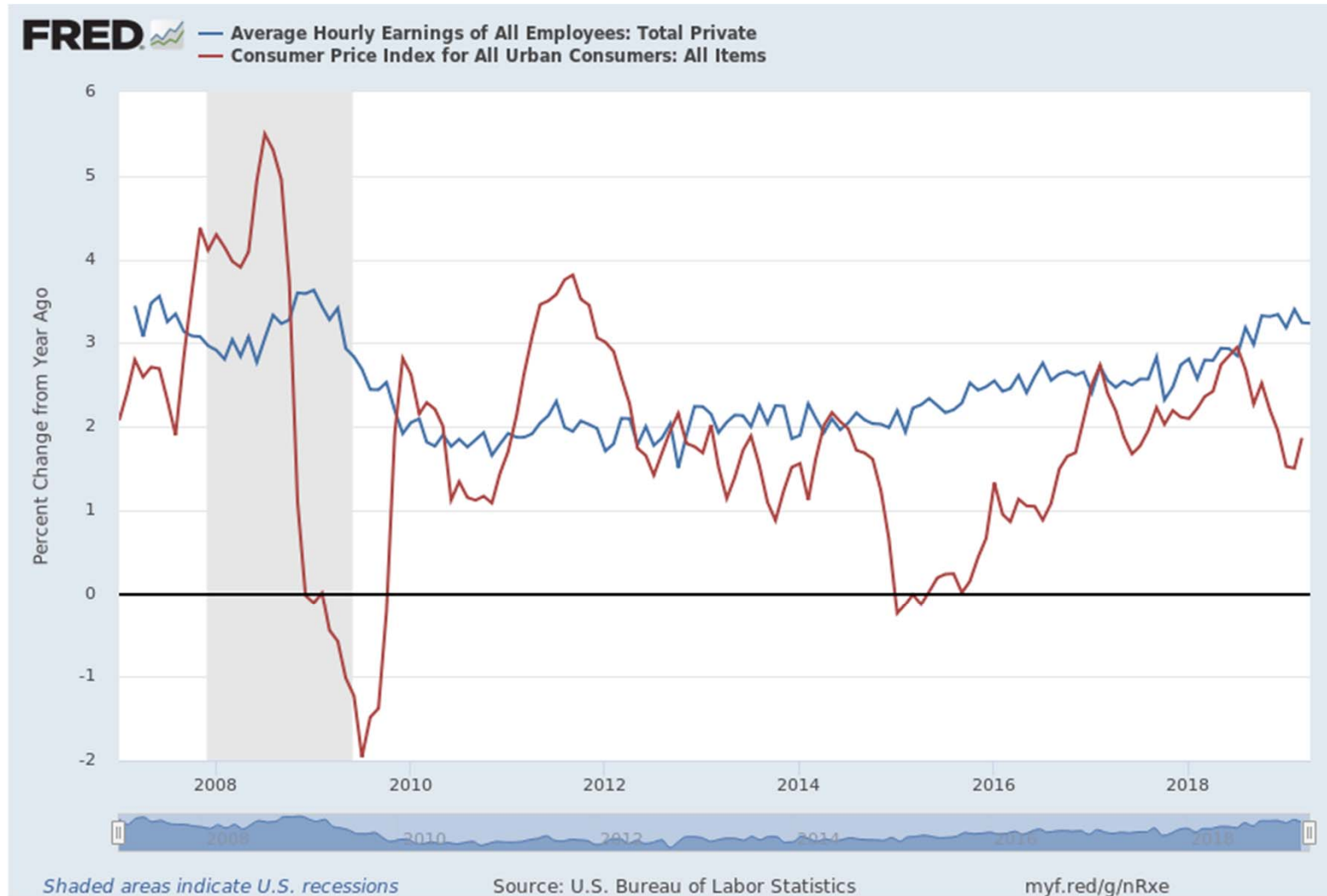
- Remains low at 3.8% in March 2019
- Well below the long-term natural rate of unemployment*

*Defined as the lowest rate of unemployment an economy will reach given real, voluntary or economic forces. FOMC estimates longer-run normal rate of unemployment is 4-5%

Source: Federal Reserve, U.S. Department of Labor

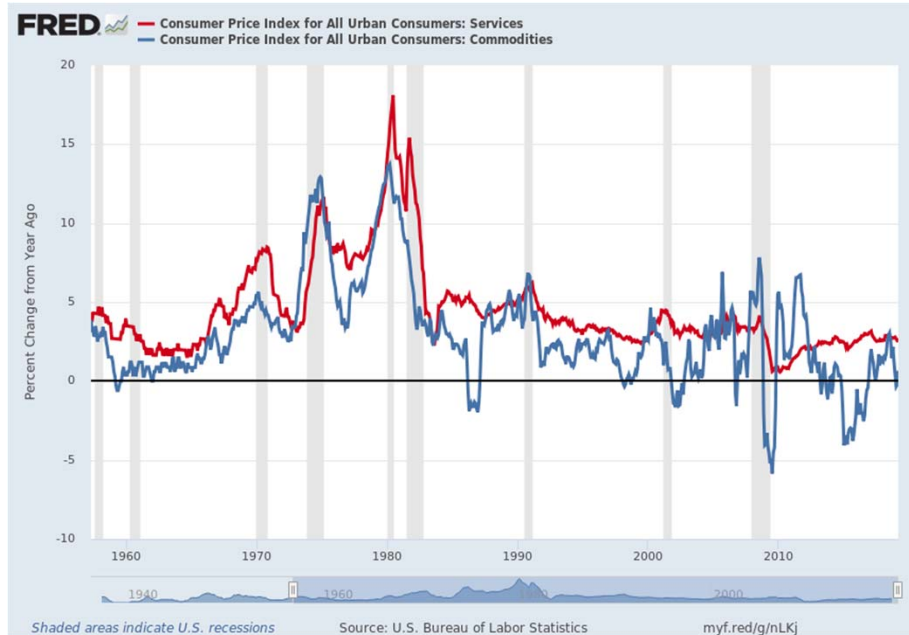
Wage Pressure?

Average Hourly Earnings Rising – Staying Ahead of Inflation



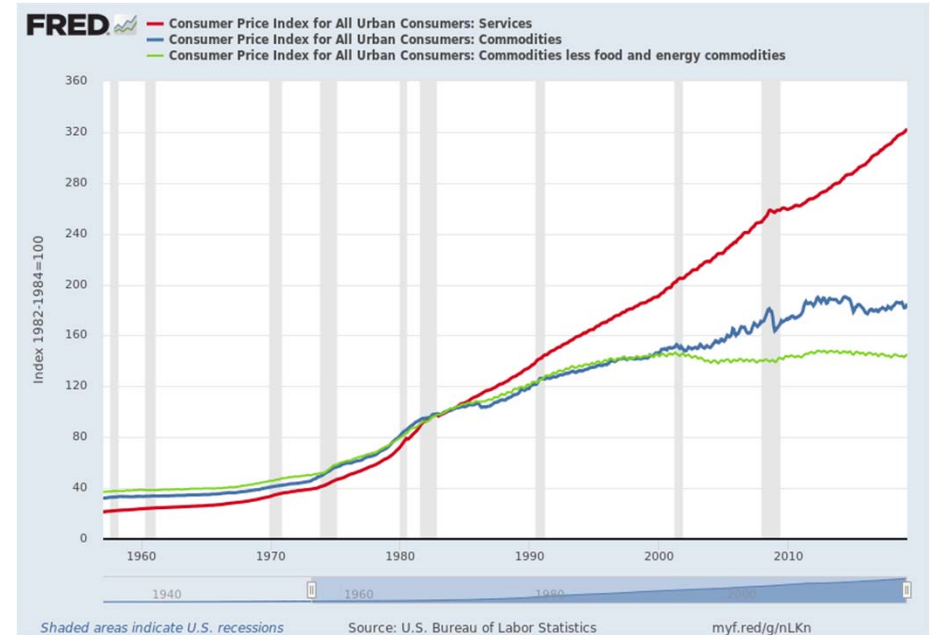
Inflation Diverges for Goods vs. Services

Services inflation much steadier than goods



Services inflation rate has been much steadier than goods inflation and consistently positive

- “Commodities” means goods in BLS inflation data.
- Goods prices capture the headlines, particularly their volatility. Goods are much more influenced than services by factors such as trade, currency, supply and demand of raw materials, and geopolitics.



Services prices have risen substantially more than goods over the past 30 years

- Services now make up about 2/3 of consumption spending, and consumption accounts for 70% of GDP.

The impact of steady services inflation translates into steadier overall inflation over time

Source: Federal Reserve, U.S. Department of Labor

Q1 Rebound Reverses Fourth Quarter Loss in U.S. Stock Market

Strongest first quarter since 2009 lifted S&P 500 close to the record level set last October

- Strong 3rd quarter put S&P up over 10% by September; obliterating TWO corrections in February and March

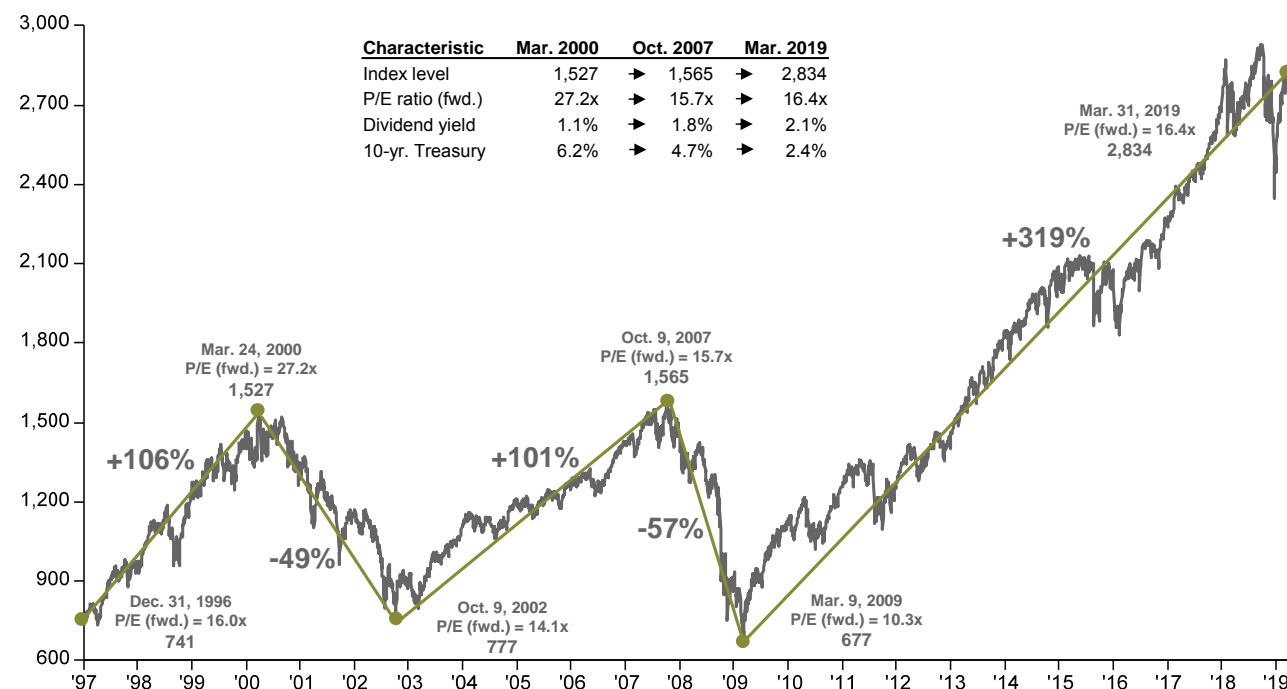
Forward valuation rose back to 16.4 in Q1, just above its 25-year average

- Still nowhere near the peak set in 2000

Dividend yield on stocks has been comparable to that of a 10-year Treasury for an extended period. Gap began to widen in 2018, but narrowed again in Q1

- Vastly different relationship between stock and bond yields in 2000 and 2007

S&P 500 Price Index




Source: Compustat, FactSet, Federal Reserve, Standard & Poor's, J.P. Morgan Asset Management.
 Dividend yield is calculated as consensus estimates of dividends for the next 12 months, divided by most recent price, as provided by Compustat.
 Forward price to earnings ratio is a bottom-up calculation based on the most recent S&P 500 Index price, divided by consensus estimates for earnings in the next 12 months (NTM), and is provided by FactSet Market Aggregates. Returns are cumulative and based on S&P 500 Index price movement only, and do not include the reinvestment of dividends. Past performance is not indicative of future returns.
 Guide to the Markets – U.S. Data are as of March 31, 2019.

Source: J.P. Morgan Asset Management.

Asset Class Performance

Periodic Table of Investment Returns for Periods Ended March 31, 2019

Best



Worst

Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years	Last 20 Years
Russell:2000 Index 14.6%	S&P:500 9.5%	S&P:500 13.5%	S&P:500 10.9%	S&P:500 15.9%	MSCI:EM Gross 8.7%
S&P:500 13.6%	NCREIF:NFI-ODCE Val Wt Nt 6.5%	Russell:2000 Index 12.9%	NCREIF:NFI-ODCE Val Wt Nt 9.2%	Russell:2000 Index 15.4%	Russell:2000 Index 8.4%
MSCI:EAFE 10.0%	Blmbg:Aggregate 4.5%	MSCI:EM Gross 11.1%	Russell:2000 Index 7.1%	MSCI:EM Gross 9.3%	NCREIF:NFI-ODCE Val Wt Nt 7.5%
MSCI:EM Gross 10.0%	3 Month T-Bill 2.1%	MSCI:EAFE 7.3%	MSCI:EM Gross 4.1%	MSCI:EAFE 9.0%	S&P:500 6.0%
Blmbg:Commodity Price Idx 5.7%	Russell:2000 Index 2.0%	NCREIF:NFI-ODCE Val Wt Nt 7.0%	Blmbg:Aggregate 2.7%	NCREIF:NFI-ODCE Val Wt Nt 7.7%	Blmbg:Aggregate 4.7%
Blmbg:Aggregate 2.9%	MSCI:EAFE (3.7%)	Blmbg:Aggregate 2.0%	MSCI:EAFE 2.3%	Blmbg:Aggregate 3.8%	MSCI:EAFE 3.9%
NCREIF:NFI-ODCE Val Wt Nt 1.2%	MSCI:EM Gross (7.1%)	3 Month T-Bill 1.2%	3 Month T-Bill 0.7%	3 Month T-Bill 0.4%	3 Month T-Bill 1.9%
3 Month T-Bill 0.6%	Blmbg:Commodity Price Idx (7.3%)	Blmbg:Commodity Price Idx 0.9%	Blmbg:Commodity Price Idx (9.6%)	Blmbg:Commodity Price Idx (3.0%)	Blmbg:Commodity Price Idx 0.0%

U.S. Equity Market

March 31, 2019

- The S&P 500 Index appreciated 13.6% in the first quarter
 - Each month in the quarter registered positive growth for the index, with the strongest performance in January
 - Technology was the strongest performing sector at +19.9%, while Health Care was the weakest despite gaining 6.6%
 - Growth outperformed Value in the first quarter
 - R1000 Growth climbed 16.1% in the first quarter, while R1000 Value grew by 11.9%
- Mid caps outperformed in the first quarter, followed by small caps and finally, large caps
 - Last quarter, the R1000 was up 14.0% vs. the R2000 which declined rose 14.6%

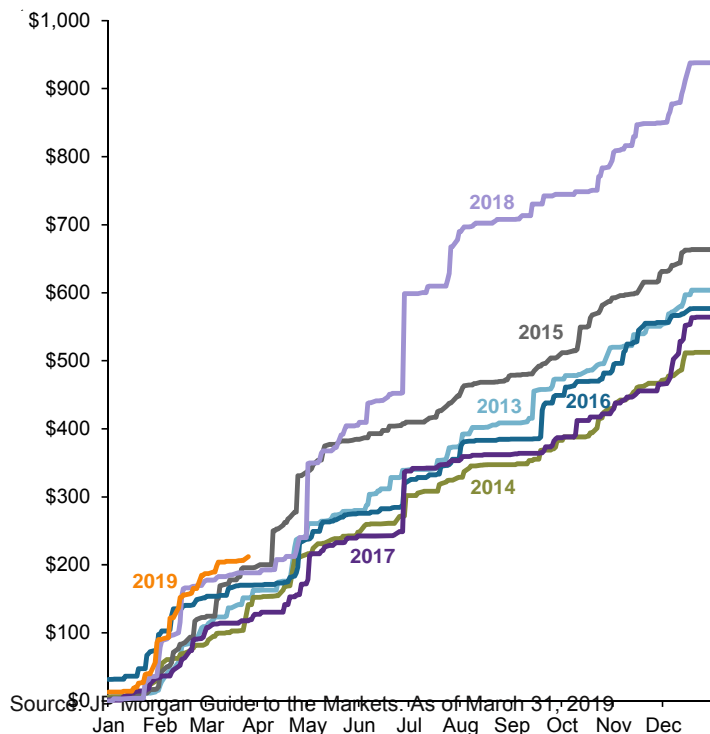
	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Large Cap Equity					
Russell 1000 Index	14.00	9.30	13.52	10.63	16.05
Russell 1000 Growth	16.10	12.75	16.53	13.50	17.52
Russell 1000 Value	11.93	5.67	10.45	7.72	14.52
Mid Cap Equity					
Russell Midcap Index	16.54	6.47	11.82	8.81	16.88
Russell Midcap Growth	19.62	11.51	15.06	10.89	17.60
Russell Midcap Value	14.37	2.89	9.50	7.22	16.39
Small Cap Equity					
Russell 2000 Index	14.58	2.05	12.92	7.05	15.36
Russell 2000 Growth	17.14	3.85	14.87	8.41	16.52
Russell 2000 Value	11.93	0.17	10.86	5.59	14.12

S&P 500 Earnings

March 31, 2019

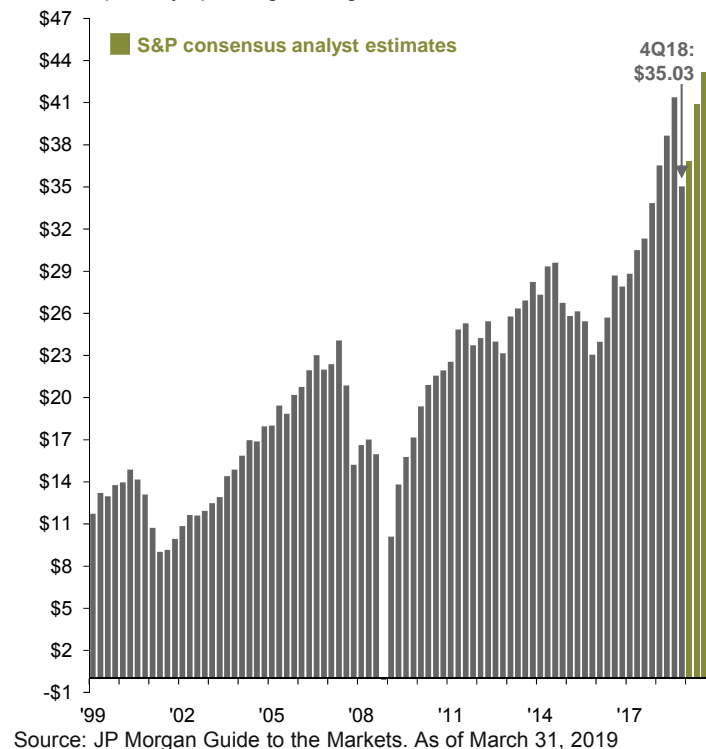
S&P 500 announced buybacks

Value of announced buybacks, \$bn



S&P 500 operating earnings per share

Index quarterly operating earnings



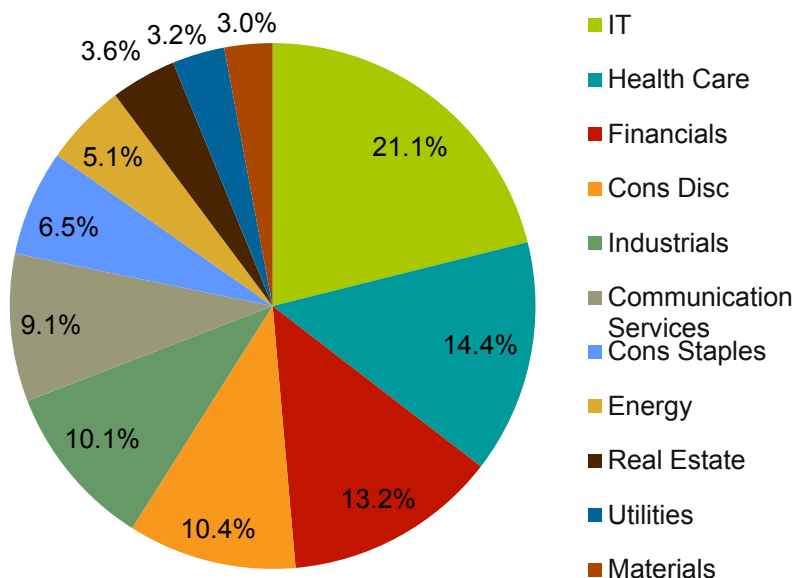
- For Q1 2019 (with 97% of the companies in the S&P 500 reporting actual results for the quarter), 76% of S&P 500 companies have reported a positive EPS surprise and 59% have reported a positive sales surprise.
- For Q1 2019, the blended earnings growth rate for the S&P 500 is -0.4%; if -0.4% is the actual growth rate for the quarter, it will mark the first year-over-year earnings decline for the index since Q2 2016 (-3.2%).

Source: FACTSET; Earnings Insight as of May 24, 2019

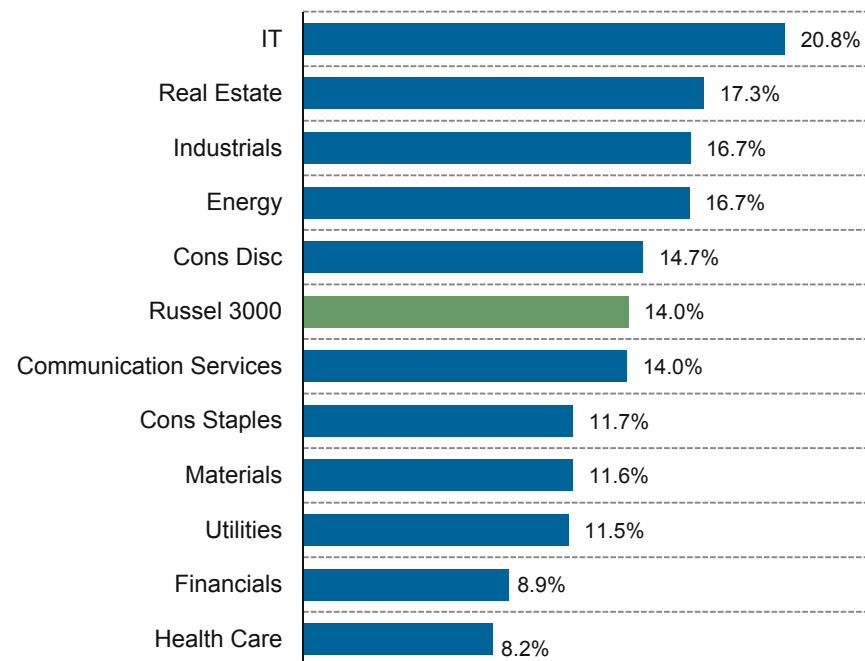
U.S. Equity Returns

March 31, 2019

Economic Sector Exposure (Russell 3000)



Quarterly Returns (Russell 3000)

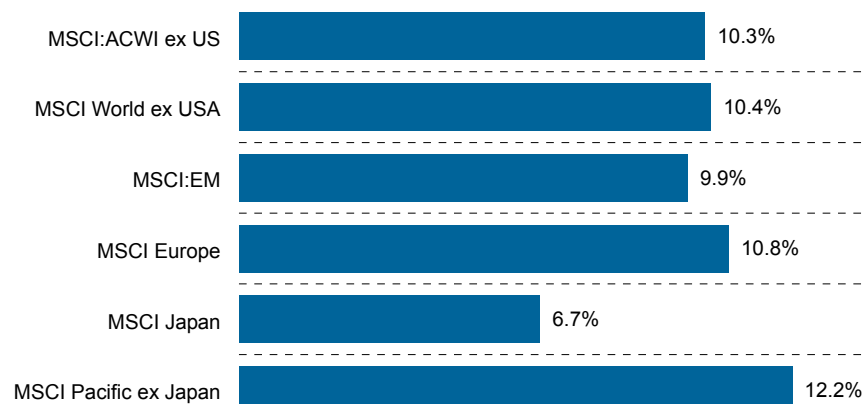


- The Russell 1000 Index rose 14.0% in the first quarter. Gains were driven by the IT sector (+20.7%), followed closely by Real Estate (+17.3%) and Industrials (+17.2%).
- The Russell 2000 Index climbed 14.6% in the first quarter. Similarly, IT (+22.5%) was the strongest performing sector, with Energy (+19.9%) and Real Estate (+17.6%) close behind.

International Equity Returns

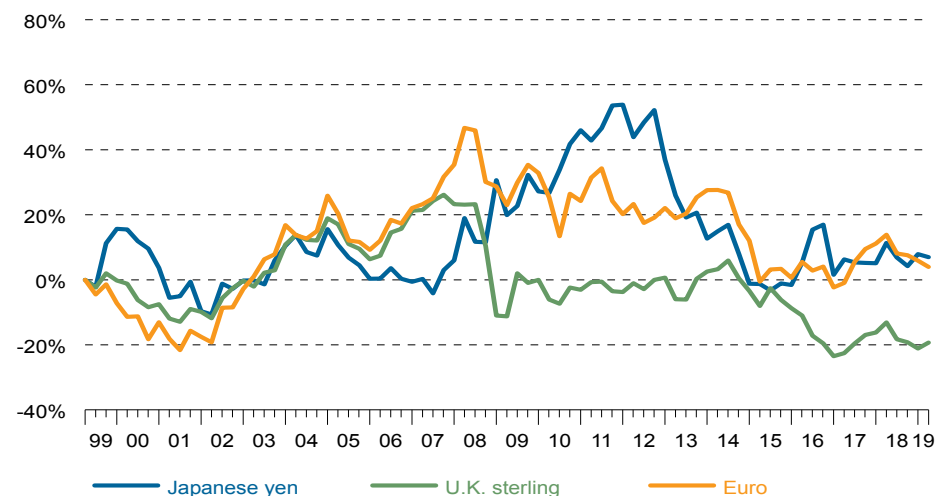
March 31, 2019

Regional Quarterly Performance (U.S. Dollar)



Source: MSCI

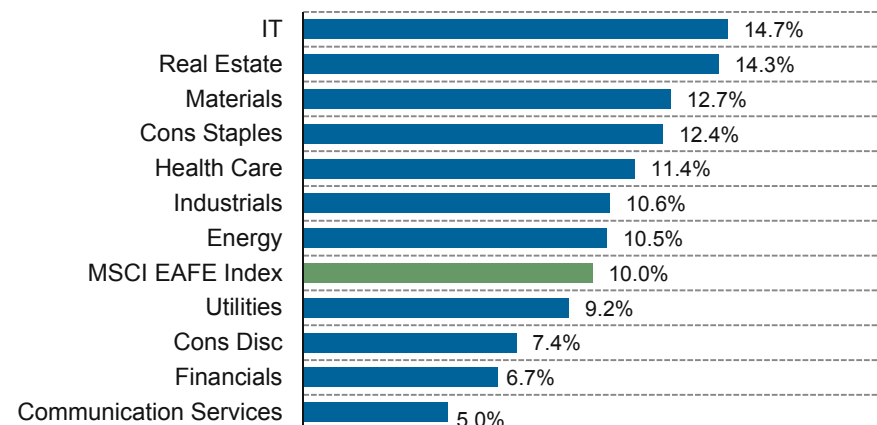
Major Currencies' Cumulative Returns (vs. U.S. Dollar)



Source: MSCI

- International equity markets performed well in the first quarter. Most regions experienced double-digit returns while Japan lagged at +6.7%.
- IT and Real Estate led performance from a sector perspective, while Communication Services lagged.
- The euro (-1.8%) and the yen (-0.9%) fell against the dollar in the first quarter, while British pound rose 2.3%.

MSCI EAFE Sector Returns

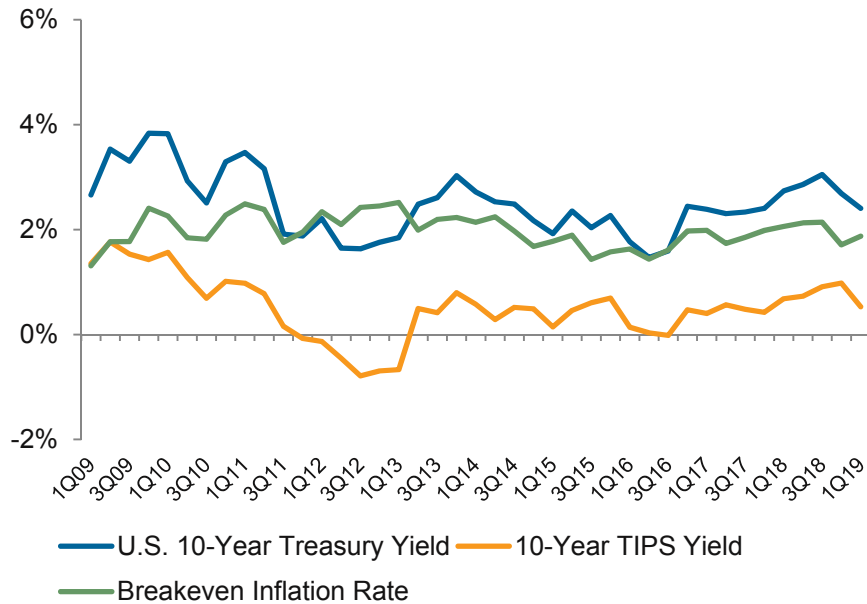


Source: MSCI

Yield Curve Changes

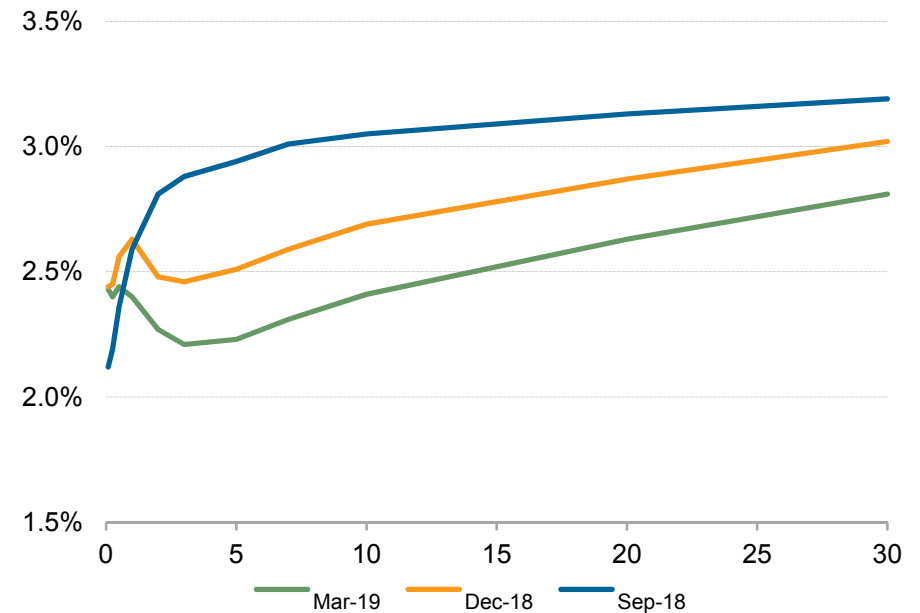
March 31, 2019

Historical 10-Year Yields



Source: Bloomberg

Treasury Yield Curve

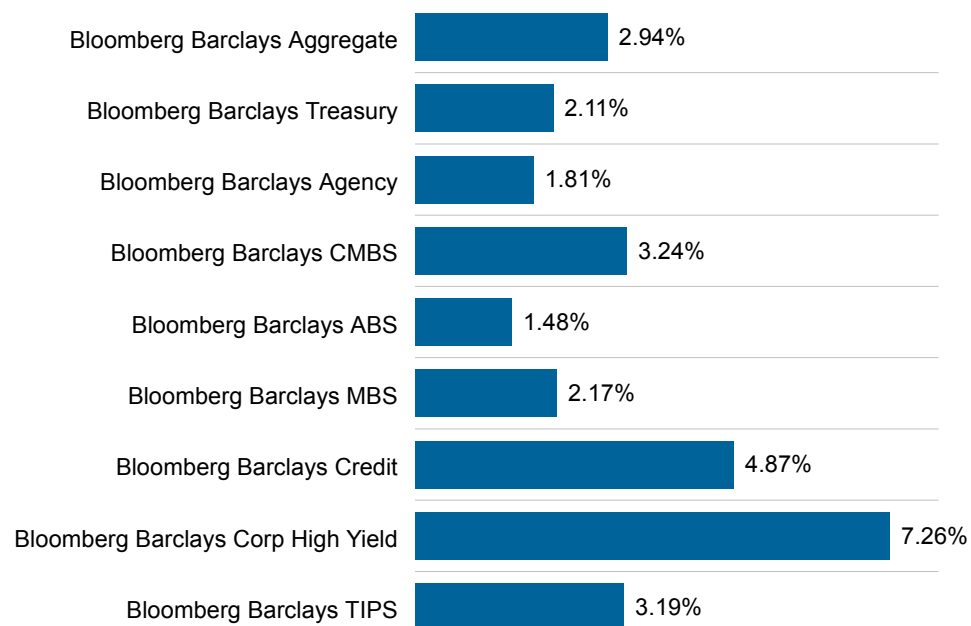


- The Fed indicated its intent to maintain the target Federal Funds rate at 2.5% for the remainder of 2019 and that quantitative tightening will cease by September.
- As the Federal Reserve struck a more dovish tone, government bond yields fell across the maturity spectrum.
- The spread between the 3-month and 10-year briefly inverted towards the end of March, but closed the period at a positive one basis point.

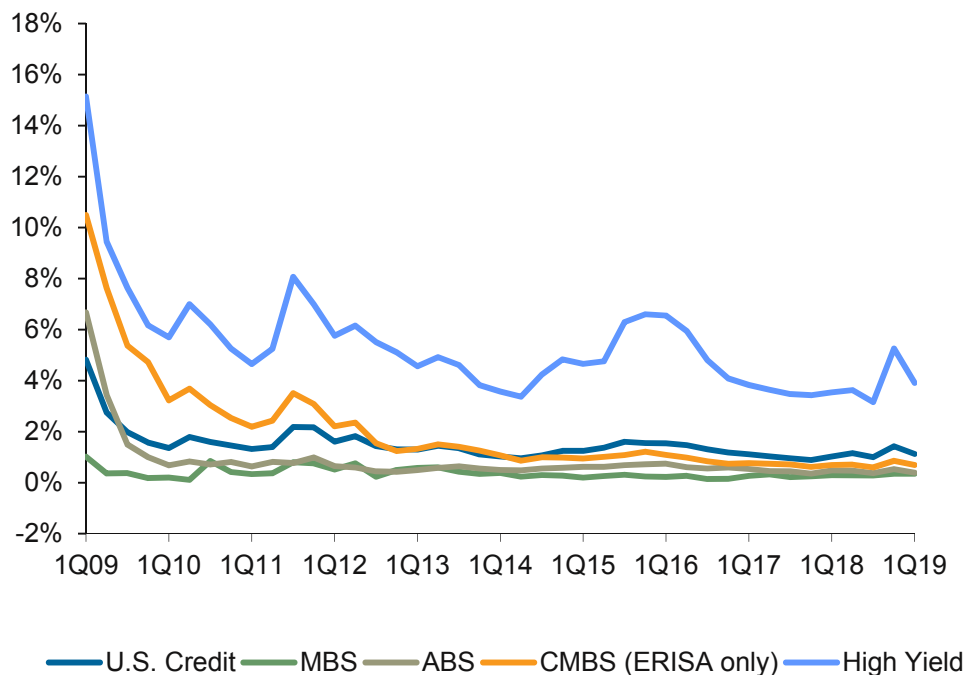
Total Rates of Return by Bond Sector

March 31, 2019

Total Returns



Effective Yield Over Treasuries

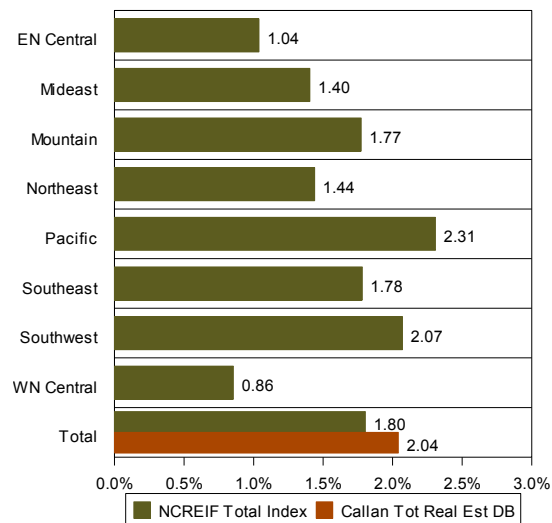


- Amid a falling rate environment, the Bloomberg Aggregate Index gained 2.9%.
- TIPS outperformed Treasuries as the Fed's balanced stance along with unexpected wage pressures stoked higher inflation expectations.
- High yield bonds outperformed other sectors as risk assets came back into favor. The Bloomberg Corporate High Yield index surged 7.3%.
 - Investment grade and high yield spreads narrowed 34 and 135 basis points, respectively.

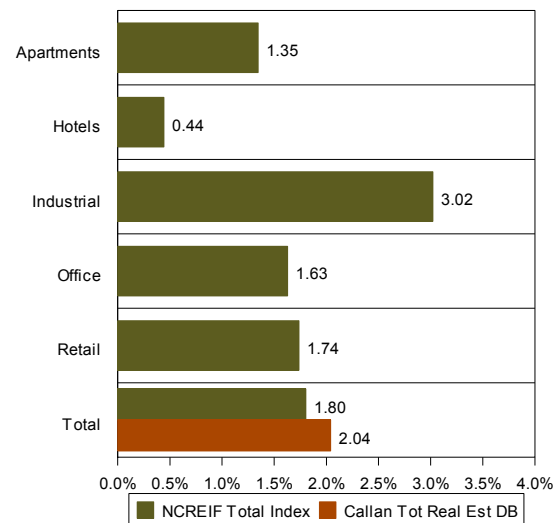
Real Estate Overview

March 31, 2019

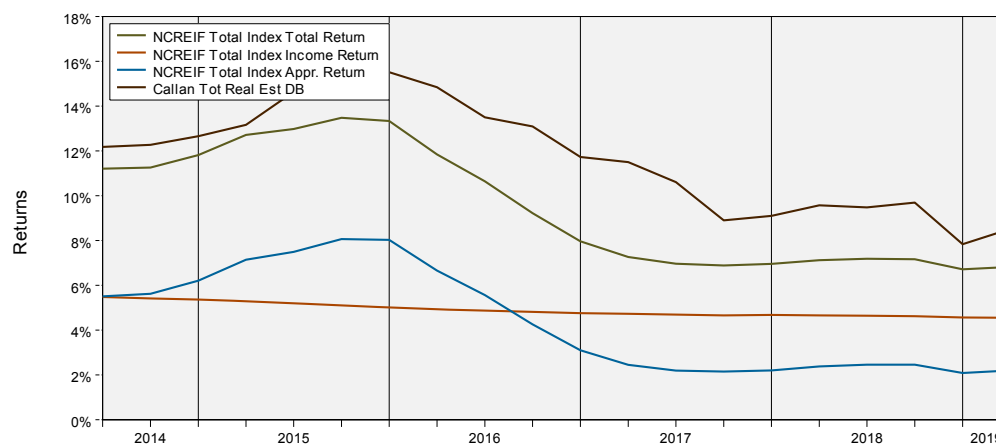
NCREIF Total Index Returns by Geographic Area
Quarter Ended March 31, 2019



NCREIF Total Index Returns by Property Type
Quarter Ended March 31, 2019



Rolling 1 Year Returns



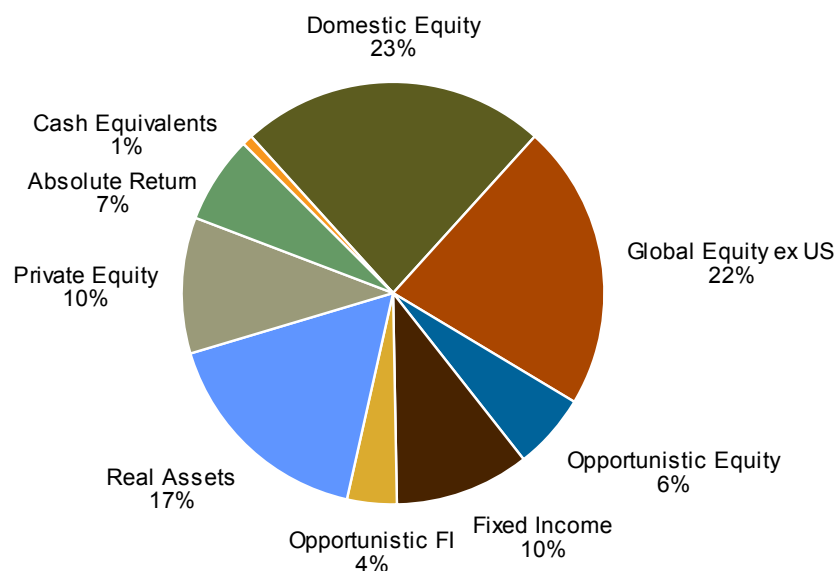
Callan

Pension Plan

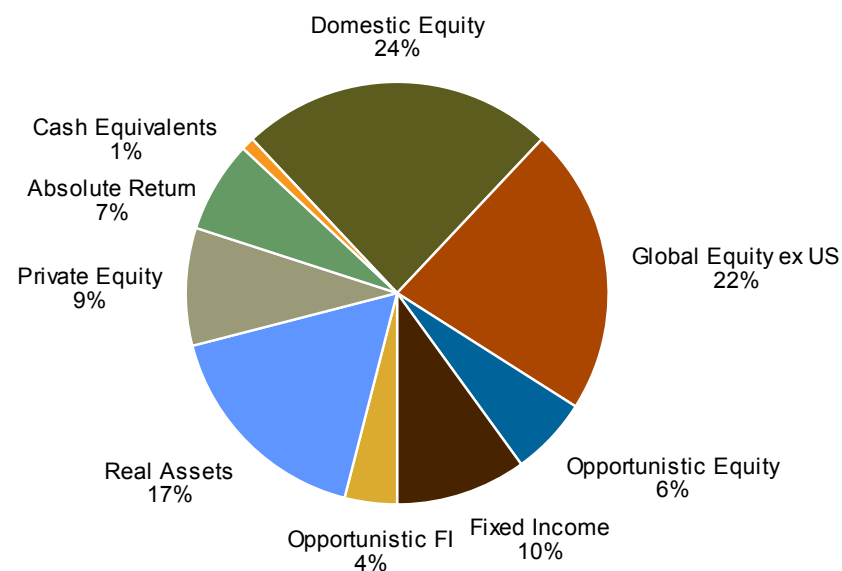
Asset Allocation – Public Employees’ Retirement System

Quarter Ending March 31, 2019

Actual Asset Allocation



Target Asset Allocation



Asset Class	\$000s Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Domestic Equity	2,185,949	23.4%	24.0%	(0.6%)	(59,390)
Global Equity ex US	2,048,523	21.9%	22.0%	(0.1%)	(9,705)
Opportunistic Equity	540,290	5.8%	6.0%	(0.2%)	(21,045)
Fixed Income	963,279	10.3%	10.0%	0.3%	27,721
Opportunistic FI	360,136	3.8%	4.0%	(0.2%)	(14,087)
Real Assets	1,580,489	16.9%	17.0%	(0.1%)	(9,960)
Private Equity	976,587	10.4%	9.0%	1.4%	134,584
Absolute Return	626,490	6.7%	7.0%	(0.3%)	(28,400)
Cash Equivalents	73,838	0.8%	1.0%	(0.2%)	(19,717)
Total	9,355,581	100.0%	100.0%		

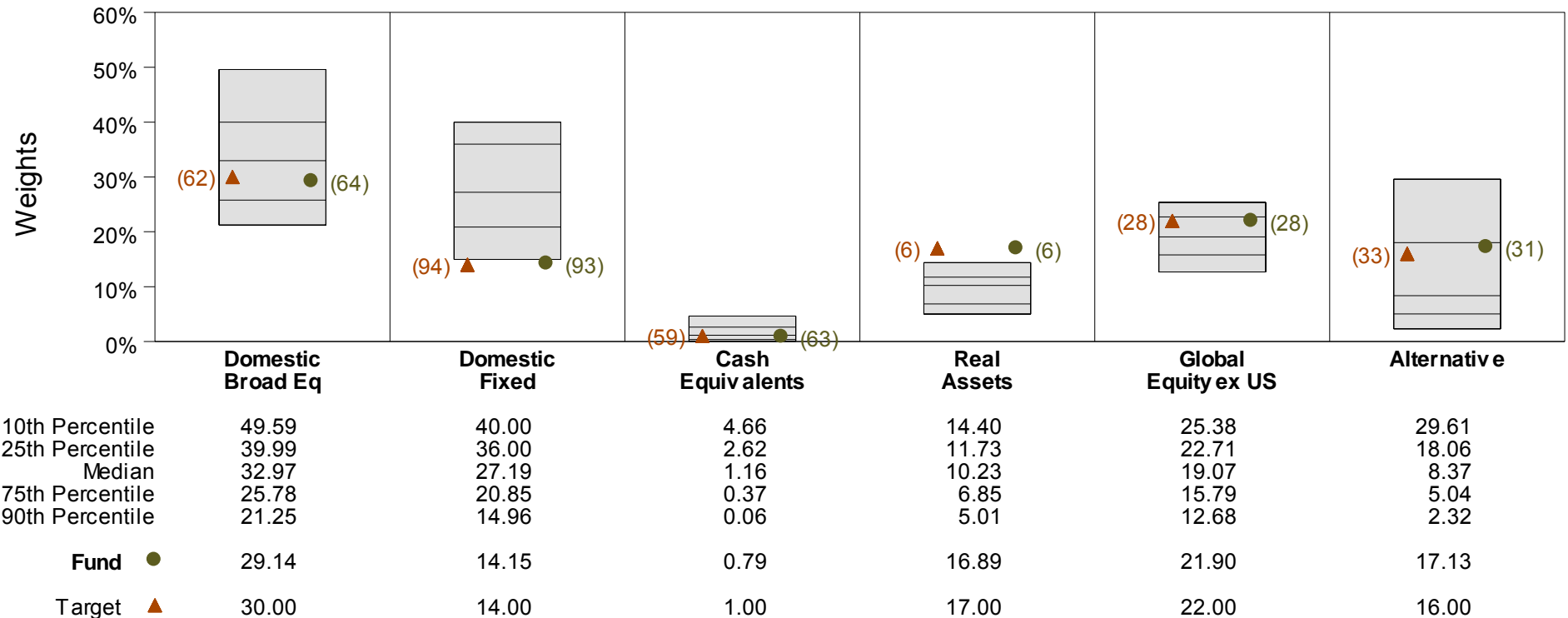
PERS is used as illustrative throughout the presentation.

The other plans exhibit similar modest and understandable variations from strategic target allocations.

Asset Allocation vs. Public Funds (PERS)

Callan Public Fund Database

Asset Class Weights vs Callan Public Fund Sponsor Database



- Asset class weights are relatively in line with their targets although Alternatives are slightly overweight while Domestic Equity is modestly underweight. Fixed income well below the “average” weighting of other public funds.
- Weightings to real assets and alternatives remain high relative to other public funds.
- ARMB’s pension funds’ asset allocation targets reflect a “growth” orientation.

*Note that “Alternative” includes private equity and absolute return

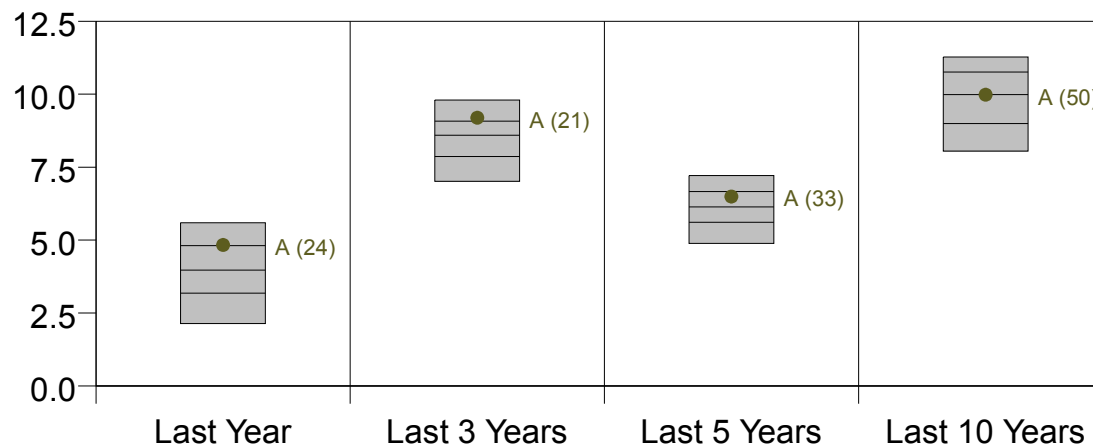
Total Fund Return vs Public Funds (PERS)

Callan Public Fund Database

Returns

for Periods Ended March 31, 2019

Group: Callan Public Fund Sponsor Database

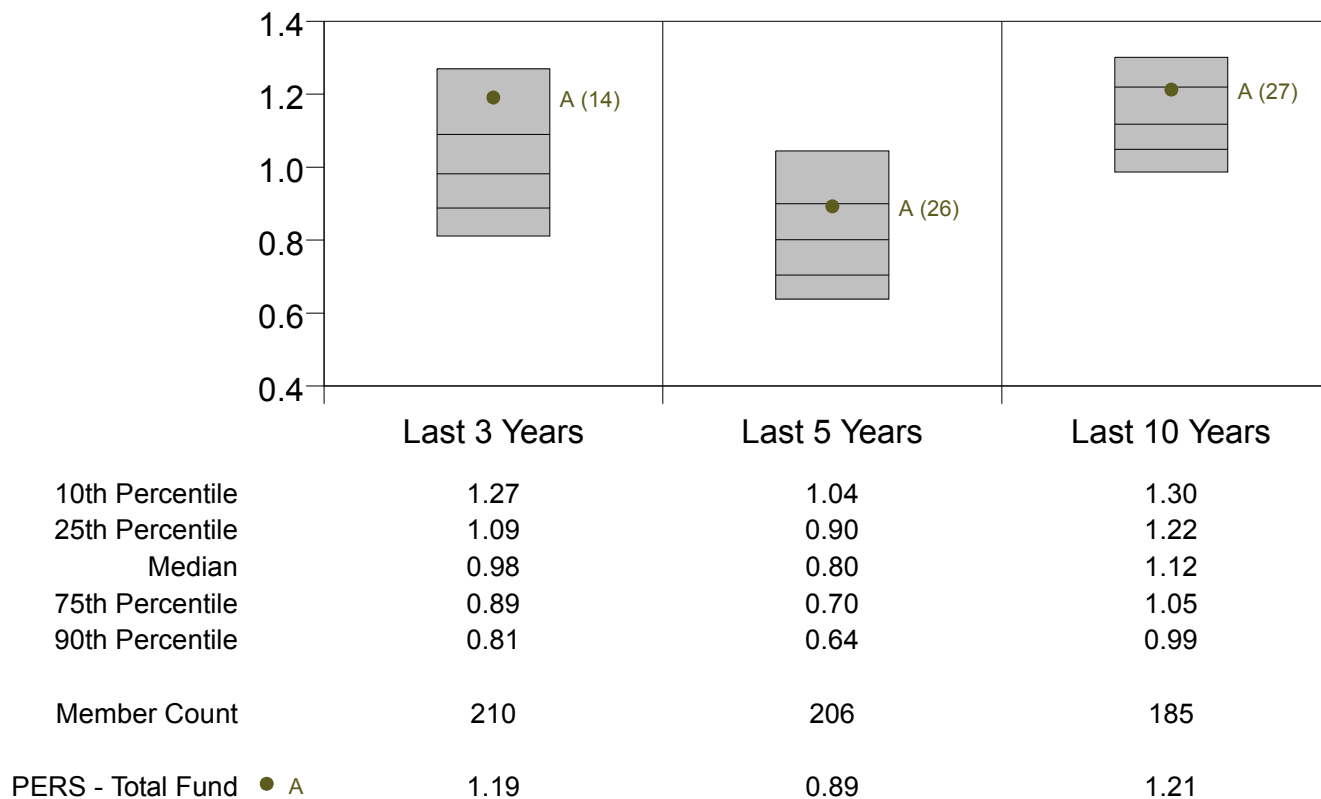


- As displayed on the previous slide, ARMB's pension portfolio allocation policy reflects an orientation toward capital growth as opposed to income generation.
- It is worth noting that the Funds' lower weighting to Domestic Equity compared to Public Fund peers will reflect relative return rankings versus that peer group based on domestic equity results.

Total Fund Sharpe Ratio Rankings vs Public Funds (PERS)

Callan Public Fund Database

Sharpe Ratio
for Periods Ended March 31, 2019
Group: Callan Public Fund Sponsor Database

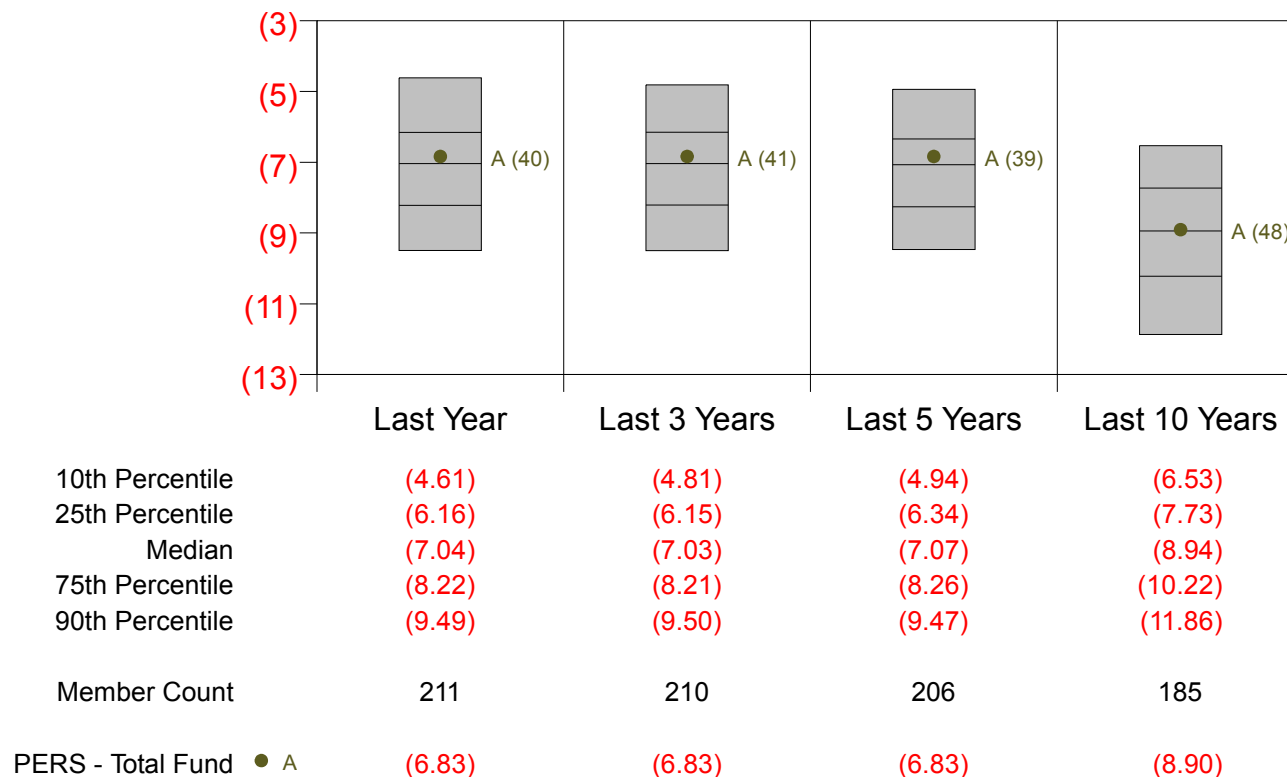


- Sharpe ratio is a risk-adjusted measure of return.
- ARMB's risk-adjusted return (Sharpe ratio) was above the Public Funds median for the three-, five-, and 10-year periods.

Total Maximum Drawdown Rankings vs Public Funds (PERS)

Callan Public Fund Database

Maximum Drawdown
for Periods Ended March 31, 2019
Group: Callan Public Fund Sponsor Database

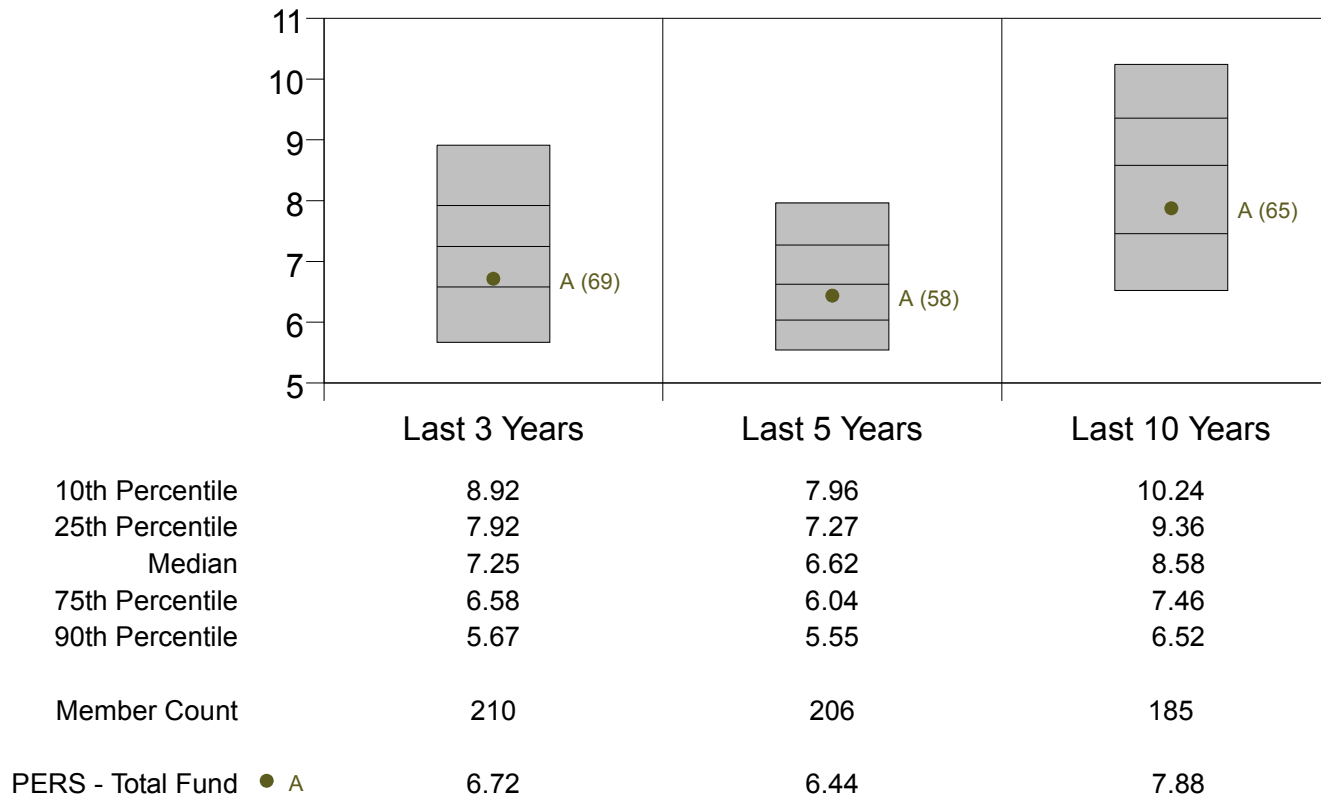


- “Maximum drawdown” is a measure of the largest loss from peak to trough in a given period.
- Lower rankings reflect larger drawdowns (i.e. bigger losses). ARMB had ranked below-median over the five- and 10-year periods but now ranks above median for all trailing periods shown as of March 31, 2019.
- Drawdowns in the last year and three years reflect performance during the fourth quarter of 2018.

Standard Deviation Ranking vs Public Funds (PERS)

Callan Public Fund Database

Standard Deviation
for Periods Ended March 31, 2019
Group: Callan Public Fund Sponsor Database



- “Standard deviation” measures variability of returns. It is one measurement of investment risk.
- Less standard deviation results in lower rankings. A lower ranking of standard deviation is good.
- ARMB’s portfolio diversification has resulted in moderate levels of volatility compared to peers.

PERS Performance – 1st Quarter 2019 & Trailing Year

Relative Attribution Effects for Quarter ended March 31, 2019

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	22%	24%	13.83%	14.04%	(0.05%)	(0.11%)	(0.15%)
Fixed-Income	11%	10%	1.74%	1.59%	0.02%	(0.06%)	(0.04%)
Opportunistic	10%	10%	6.19%	9.58%	(0.34%)	0.00%	(0.34%)
Real Assets	18%	17%	4.82%	5.99%	(0.21%)	(0.03%)	(0.24%)
Global Equity ex US	20%	22%	10.25%	10.31%	(0.01%)	(0.02%)	(0.03%)
Private Equity	11%	9%	2.74%	12.74%	(1.09%)	0.05%	(1.03%)
Absolute Return	7%	7%	2.77%	4.62%	(0.13%)	(0.01%)	(0.14%)
Cash Equivalents	1%	1%	0.67%	0.60%	0.00%	0.00%	0.01%
Total			7.27%	= 9.25%	+ (1.81%)	+ (0.17%)	(1.98%)

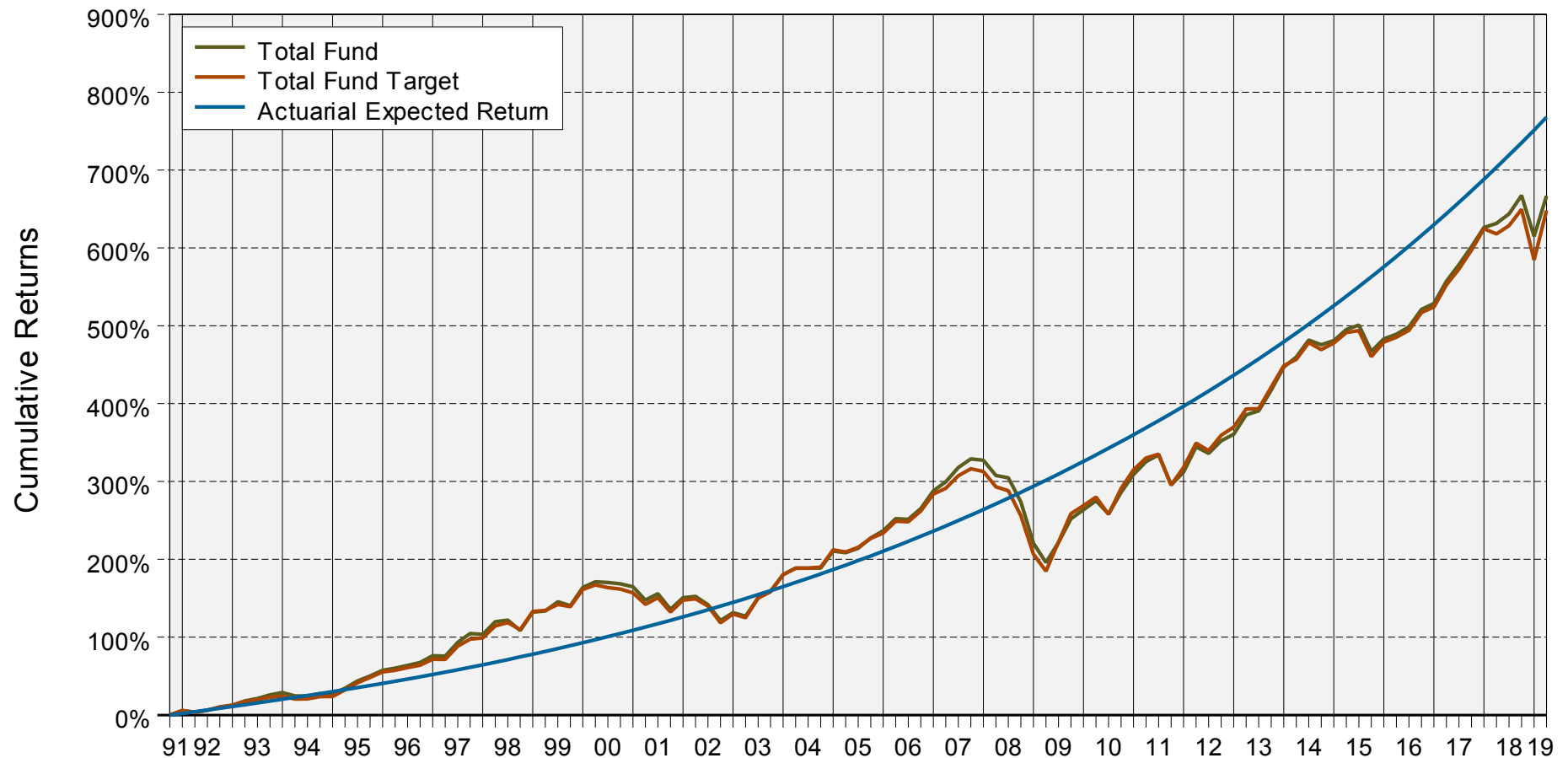
One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	23%	24%	8.39%	8.77%	(0.08%)	(0.17%)	(0.25%)
Fixed-Income	10%	10%	3.93%	3.80%	0.01%	(0.07%)	(0.06%)
Opportunistic	10%	10%	5.17%	7.92%	(0.26%)	(0.02%)	(0.28%)
Real Assets	18%	17%	8.01%	8.69%	(0.11%)	0.04%	(0.07%)
Global Equity ex US	21%	22%	(5.69%)	(4.96%)	(0.17%)	0.03%	(0.14%)
Private Equity	10%	9%	16.16%	2.67%	1.21%	(0.01%)	1.19%
Absolute Return	7%	7%	4.31%	0.14%	0.31%	(0.01%)	0.30%
Cash Equivalents	1%	1%	2.35%	2.12%	0.00%	0.01%	0.01%
Total			4.84%	= 4.15%	+ 0.89%	+ (0.20%)	0.69%

- The long-term benchmark for private equity is the Russell 3000 Index plus 350 basis points

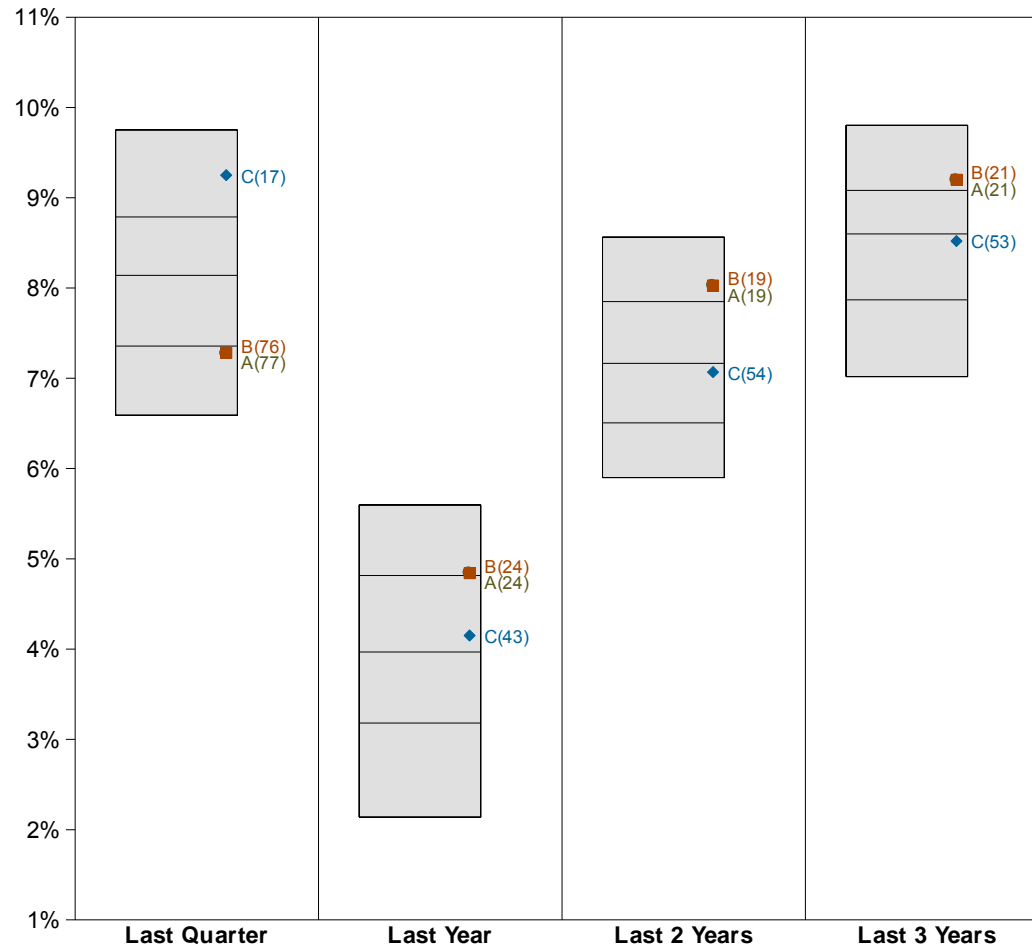
PERS Long-Term Total Fund Performance as of 3/31/19

Cumulative Returns Actual vs Target






- Each Fund has two targets: the asset allocation policy return and the actuarial return.
- Total Fund returns continue to closely track the strategic allocation target.
- Setbacks in 3Q15 and 4Q18 have hindered the Total Fund's progress toward closing the gap versus the actuarial return following the Global Financial Crisis of 2008/2009.

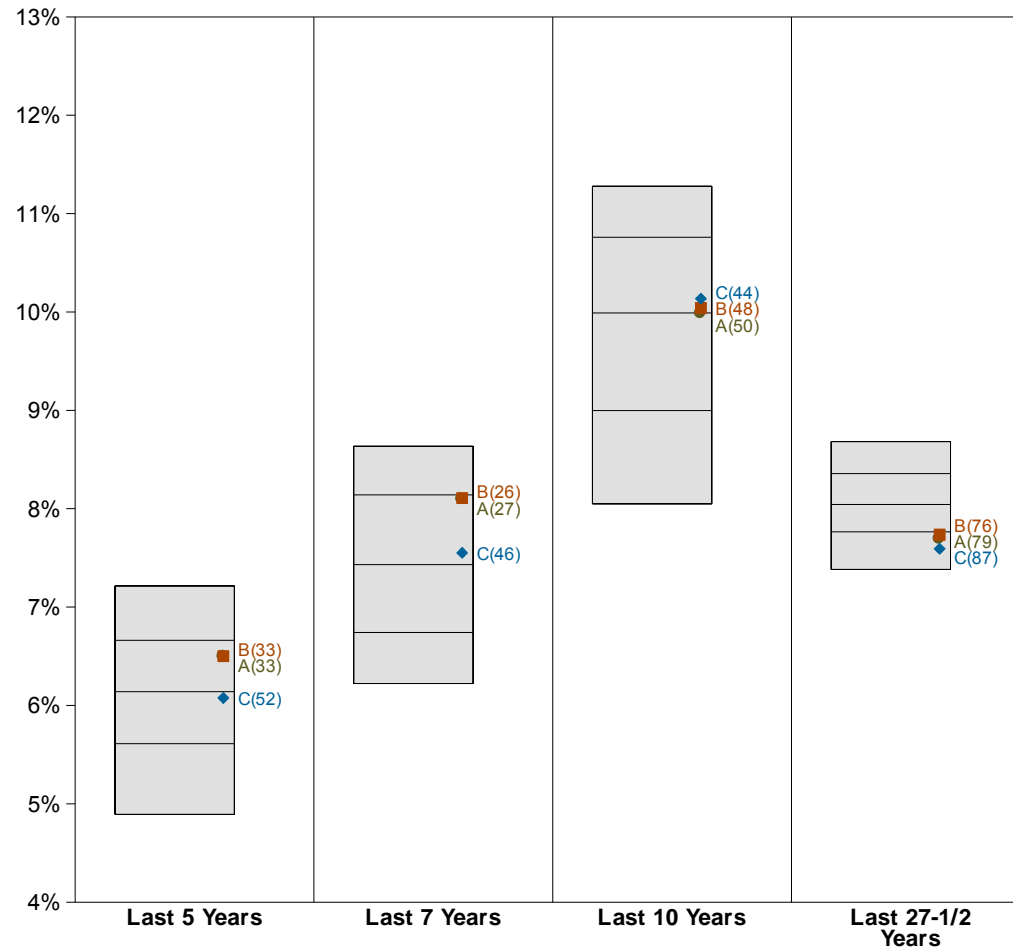
Annualized Total Fund Returns as of 3/31/19



- PERS and TRS have outperformed their target for the last year, two-year, and three-year periods.
- PERS 1st quarter performance trailed the target significantly, underperforming by 198 basis points. Underperformance in Private Equity was the primary detractor.

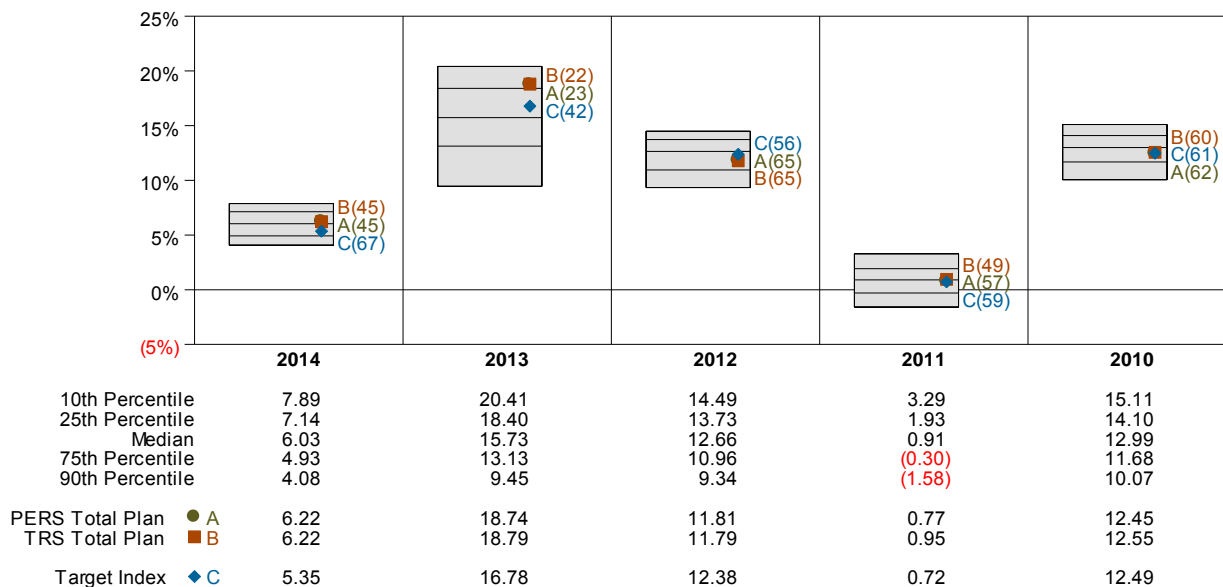
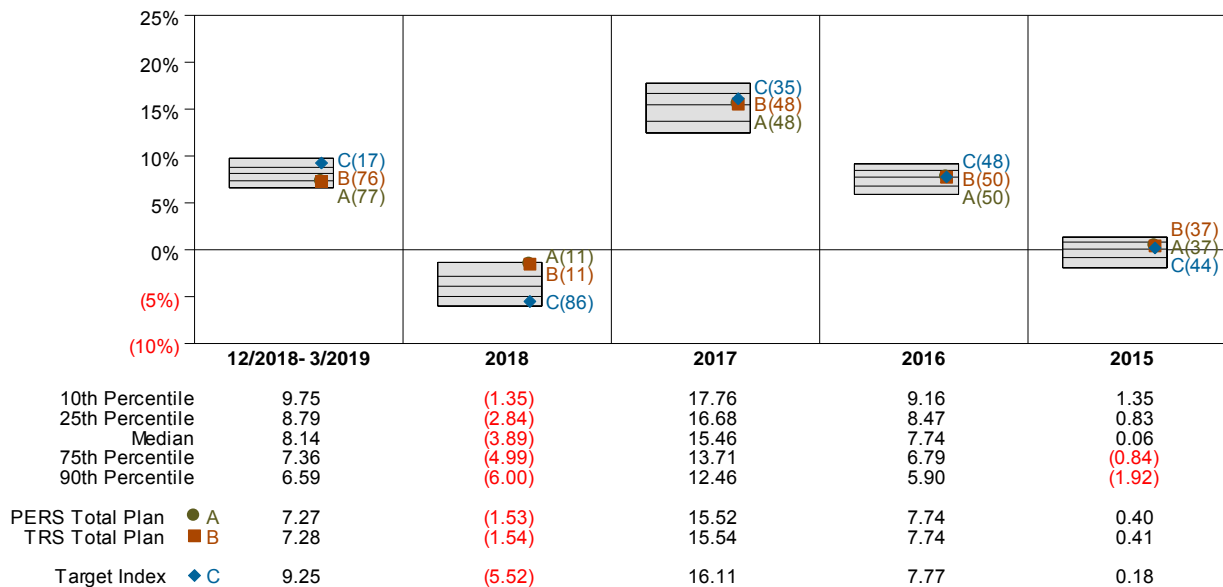
10th Percentile	9.75	5.60	8.56	9.80
25th Percentile	8.79	4.82	7.85	9.08
Median	8.14	3.97	7.17	8.60
75th Percentile	7.36	3.18	6.51	7.87
90th Percentile	6.59	2.14	5.90	7.02
PERS Total Plan  A	7.27	4.84	8.02	9.19
TRS Total Plan  B	7.28	4.84	8.03	9.20
Target Index  C	9.25	4.15	7.07	8.52

Longer-Term Total Fund Returns as of 3/31/19



- Five-year performance is above target and median.
- Seven-year performance is also above target and median.
- 10-year return is in line with target and median.
- 27½ year return for PERS beats the target by 10 basis points.

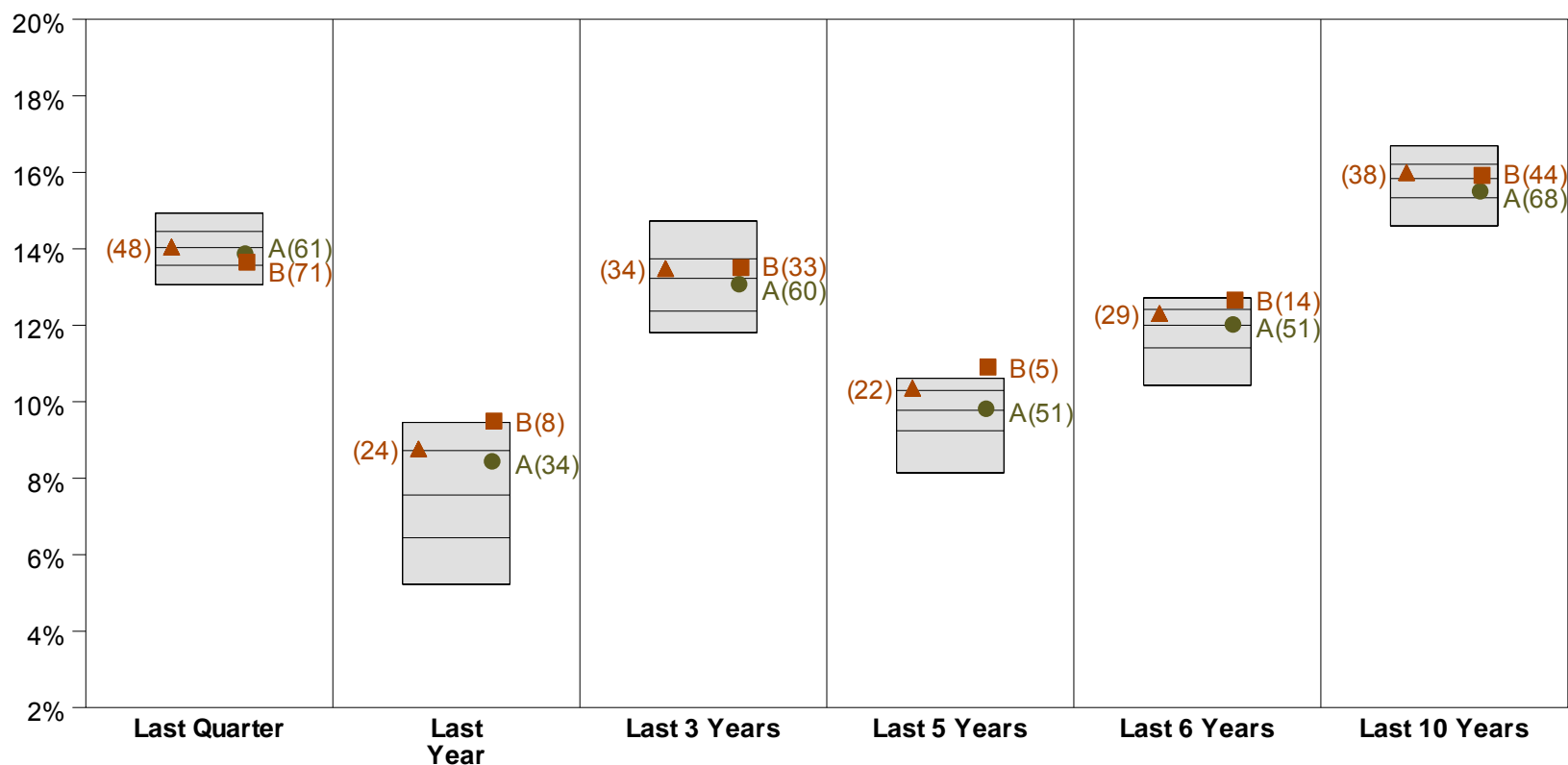
Calendar Period Total Fund Performance



- Peer group range of returns during 2016, 2015, and 2014 were very tight.
- Wide range of peer group returns during calendar 2013 due to varying fixed-income allocations within the Public Fund universe.
- PERS ranks above median in five and TRS ranks above median in six of the 10 periods shown.

Total Domestic Equity through 3/31/19

Performance vs Public Fund - Domestic Equity (Gross)



10th Percentile	14.93	9.46	14.72	10.61	12.72	16.69	
25th Percentile	14.46	8.72	13.74	10.30	12.42	16.21	
Median	14.03	7.56	13.23	9.78	12.00	15.84	
75th Percentile	13.57	6.44	12.37	9.24	11.41	15.33	
90th Percentile	13.06	5.22	11.81	8.14	10.43	14.60	
Domestic Equity Pool	● A	13.83	8.40	13.03	9.77	11.97	15.46
Standard & Poor's 500	■ B	13.65	9.50	13.51	10.91	12.66	15.92
Russell 3000 Index	▲	14.04	8.77	13.48	10.36	12.31	16.00

Domestic Equity Component Returns

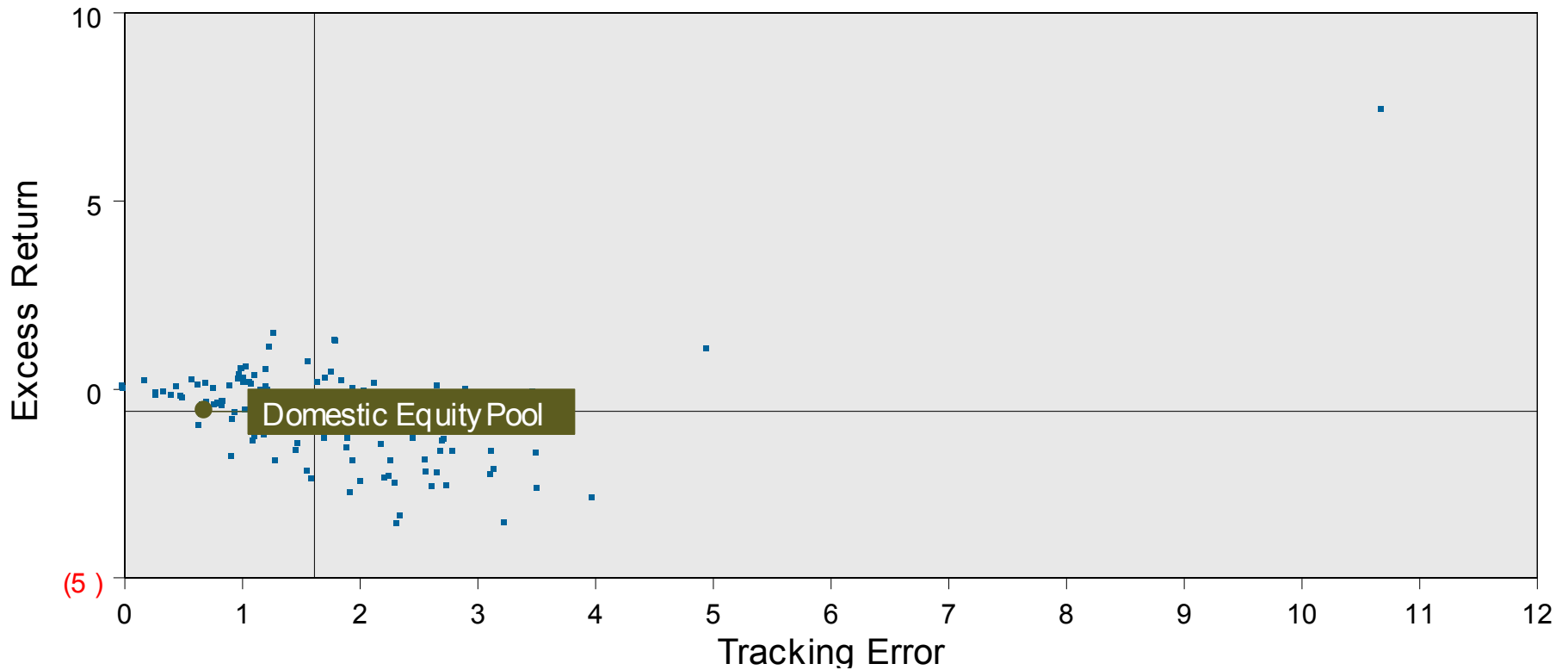
Returns for Periods Ended March 31, 2019

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years
Total Dom Equity Pool	13.83%	8.40%	13.03%	9.77%	11.97%
Russell 3000 Index	14.04%	8.77%	13.48%	10.36%	12.31%
Large Cap Managers	13.85%	9.17%	13.27%	10.48%	12.49%
Large Cap Active	13.69%	7.06%	13.09%	10.07%	12.36%
Large Cap Passive	14.05%	9.63%	13.55%	10.77%	12.60%
Russell 1000 Index	14.00%	9.30%	13.52%	10.63%	12.52%
Small Cap Managers	14.13%	3.79%	13.73%	7.41%	10.76%
Small Cap Active	14.70%	4.38%	14.54%	7.73%	11.09%
Small Cap Passive	11.64%	1.72%	10.38%	6.47%	9.15%
Russell 2000 Index	14.58%	2.05%	12.92%	7.05%	9.84%
Opportunistic Equity	8.06%	7.68%	8.77%	6.59%	8.29%

- The active large cap allocation (fourth line in the table above) has trailed its benchmark (the Russell 1000 index) over all periods shown.
- The overall small cap allocation has contributed positive excess return when compared to its benchmark (the Russell 2000 index).

Domestic Equity Excess Return and Risk

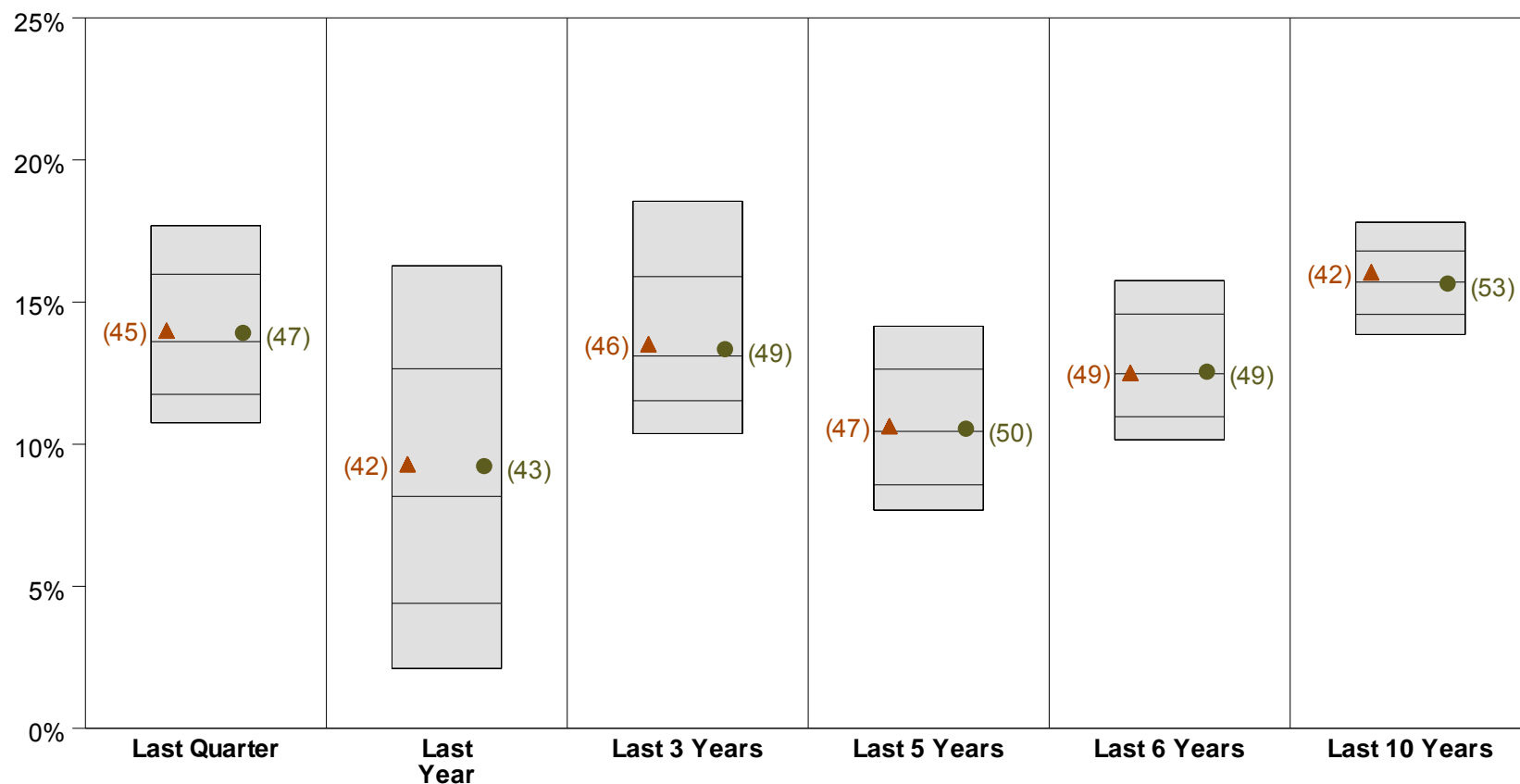
Risk Analysis vs. Public Fund – Domestic Equity (Gross)
Five Years Ended March 31, 2019



- The Domestic Equity Pool has slightly underperformed the Russell 3000 Index over five years but exhibits very tight tracking (low tracking error) to the benchmark relative to public fund peers.

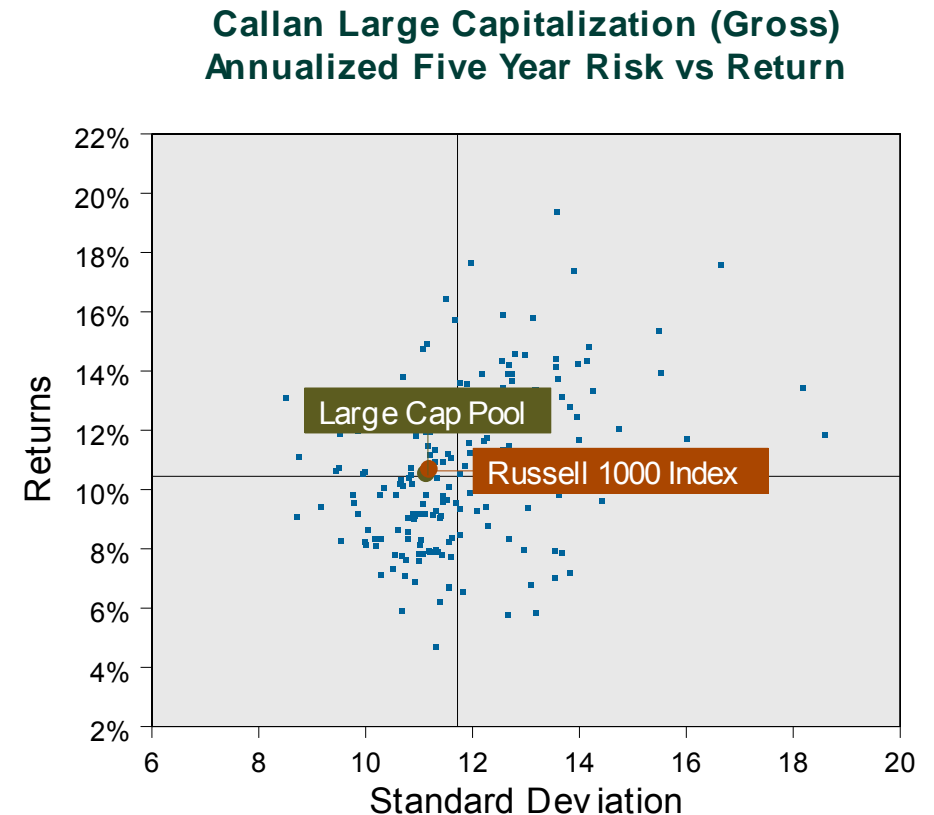
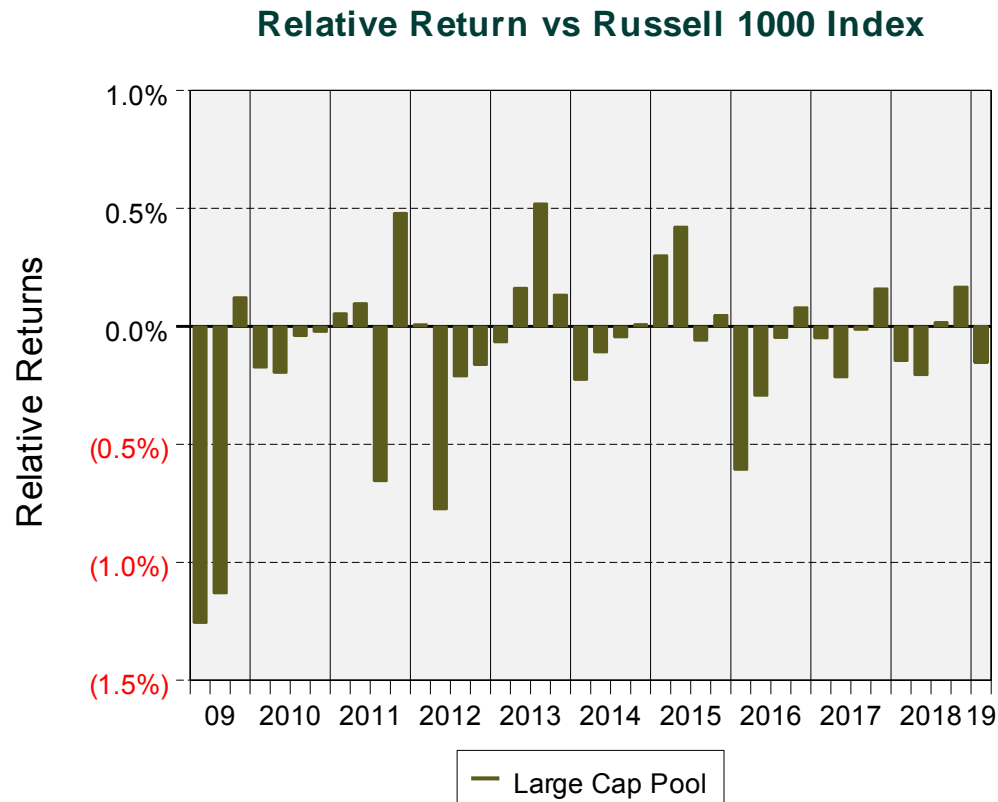
Large Cap Domestic Equity through 3/31/19

Performance vs Callan Large Capitalization (Gross)



10th Percentile	17.69	16.28	18.54	14.15	15.76	17.81
25th Percentile	15.98	12.66	15.90	12.64	14.58	16.79
Median	13.61	8.16	13.10	10.45	12.48	15.71
75th Percentile	11.75	4.40	11.53	8.57	10.96	14.57
90th Percentile	10.75	2.11	10.37	7.68	10.15	13.86
Large Cap Pool ●	13.85	9.17	13.27	10.48	12.49	15.59
Russell 1000 Index ▲	14.00	9.30	13.52	10.63	12.52	16.05

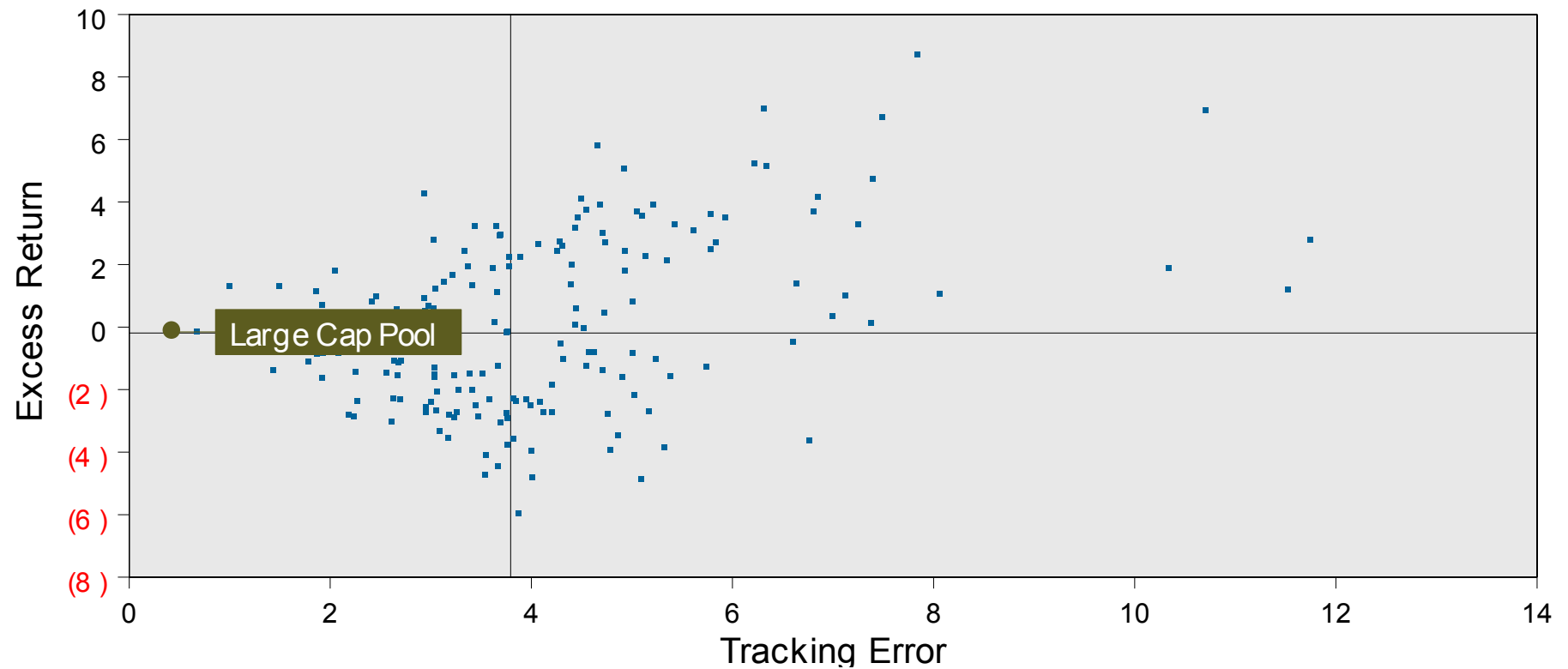
Large Cap Domestic Equity as of 3/31/19



- Over half of the large cap allocation is passively managed.
- Long-term performance exhibits market-like returns with similar risk.

Large Cap Domestic Equity Excess Return and Risk

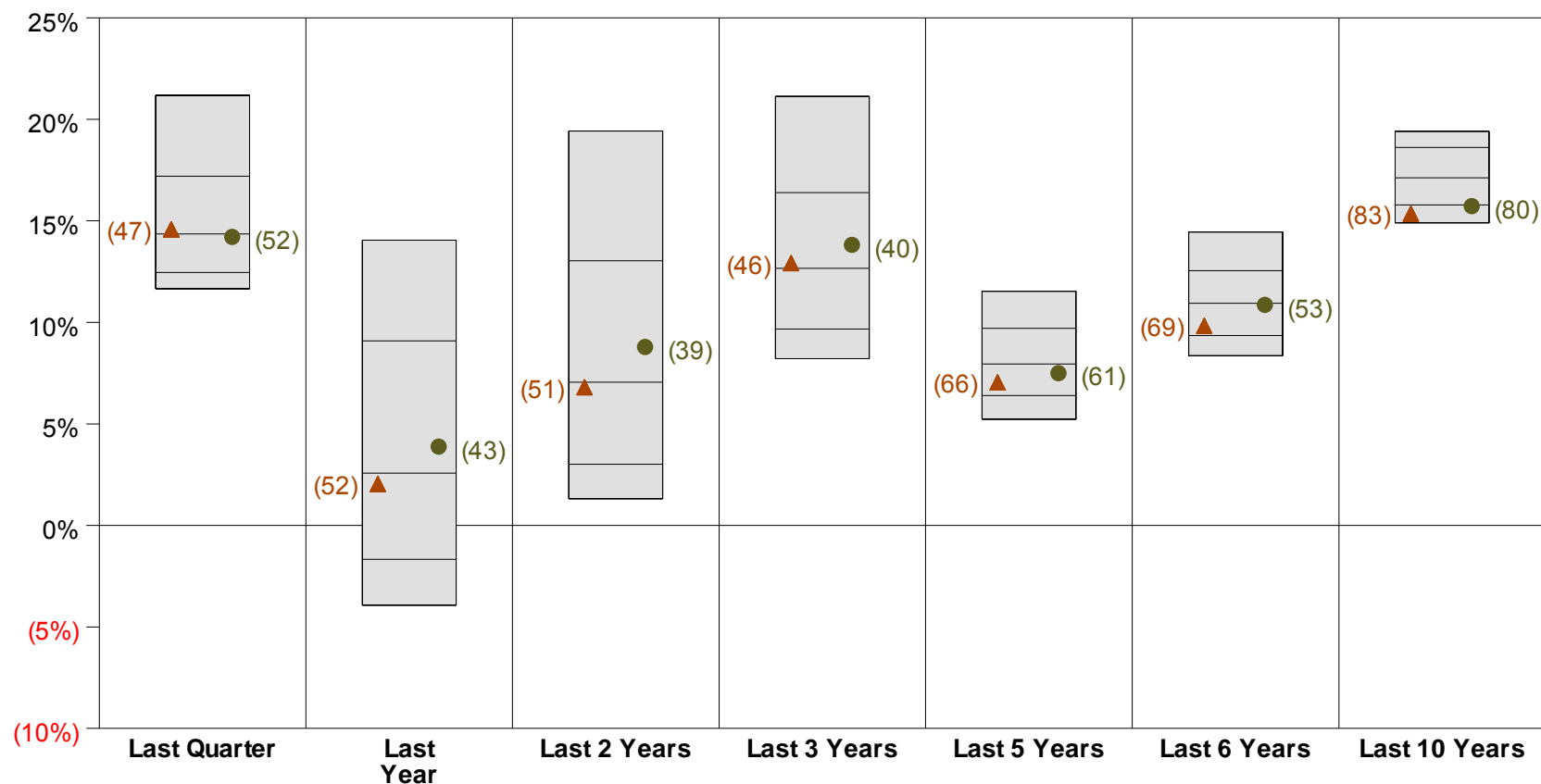
Risk Analysis vs. Callan Large Capitalization (Gross)
Five Years Ended March 31, 2019



- The Large Cap Domestic Equity Pool has moderately underperformed the Russell 1000 Index over five years but exhibits extremely tight tracking (low tracking error) to the benchmark relative to large cap peers.

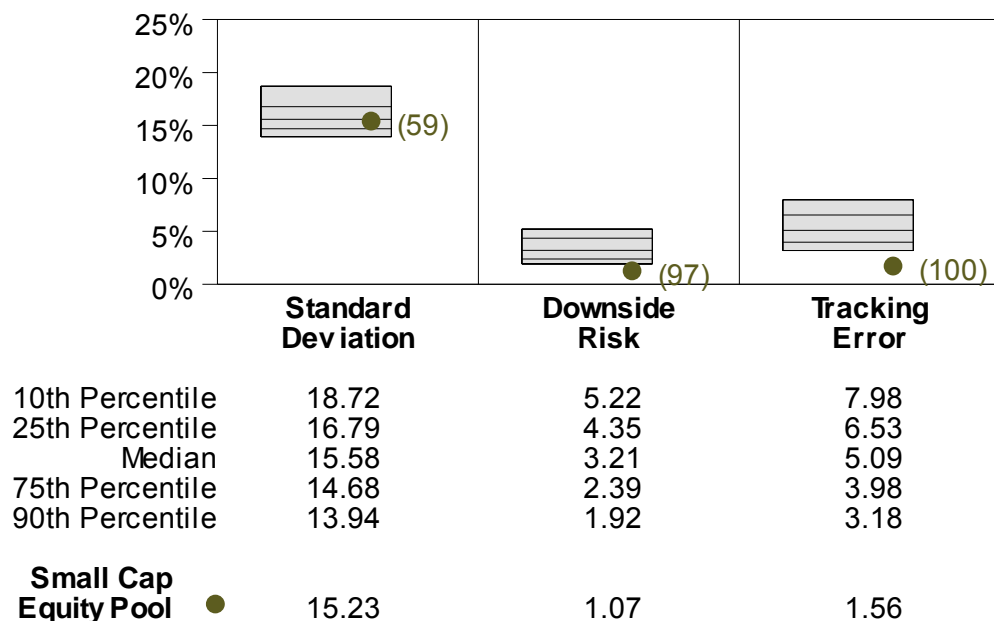
Small Cap Domestic Equity through 3/31/19

Performance vs Callan Small Capitalization (Gross)

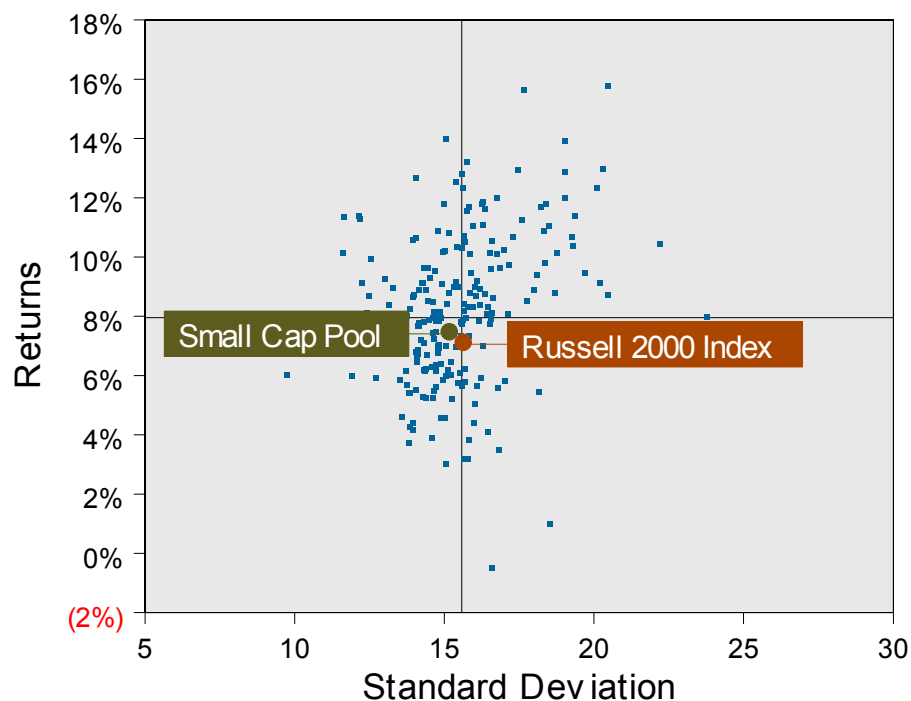


10th Percentile	21.19	14.05	19.43	21.13	11.53	14.46	19.41
25th Percentile	17.20	9.09	13.04	16.39	9.70	12.54	18.62
Median	14.36	2.58	7.06	12.66	7.96	10.94	17.12
75th Percentile	12.46	(1.67)	3.01	9.67	6.40	9.35	15.78
90th Percentile	11.65	(3.93)	1.31	8.21	5.23	8.36	14.90
Small Cap Pool	14.13	3.79	8.70	13.73	7.41	10.76	15.63
Russell 2000 Index	14.58	2.05	6.81	12.92	7.05	9.84	15.36

Small Cap Domestic Equity through 3/31/19



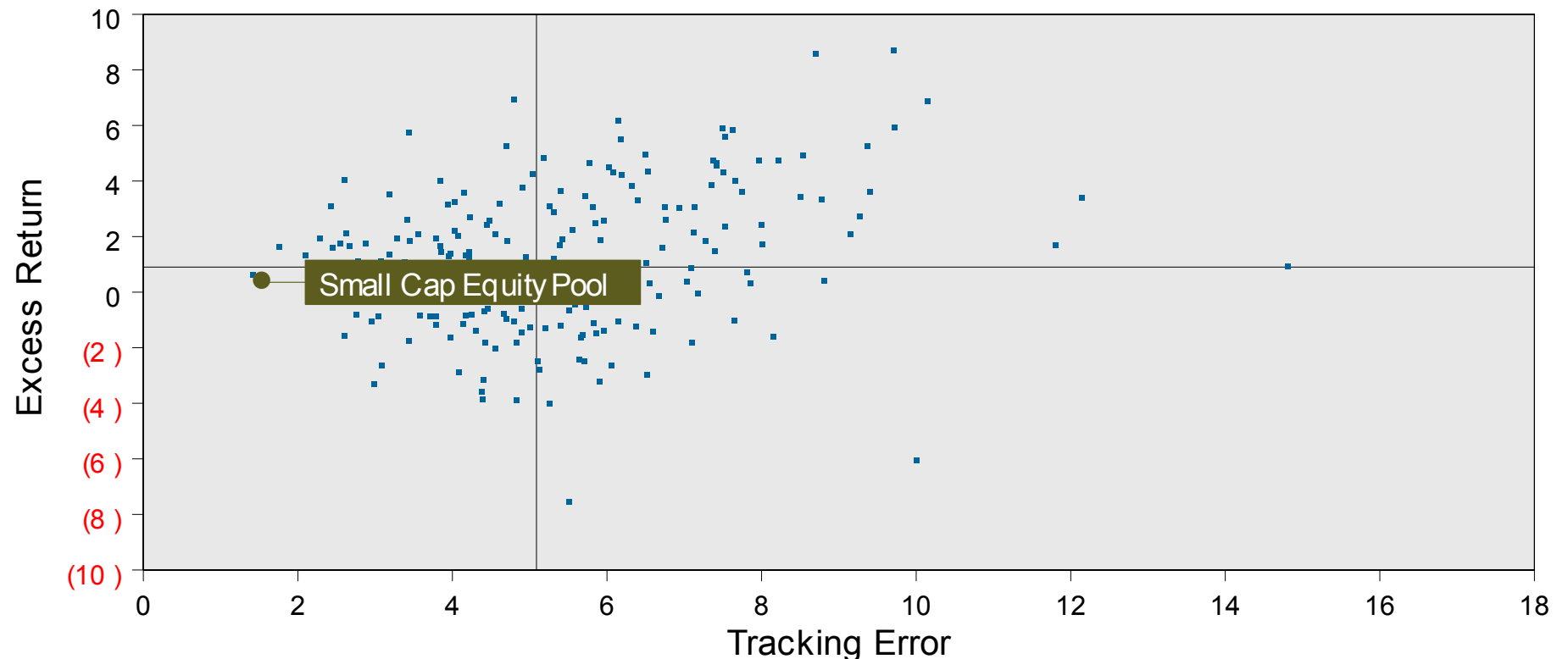
Callan Small Capitalization (Gross)
Annualized Five Year Risk vs Return



- The five-year risk statistics of standard deviation, downside risk, and tracking error compare favorably versus the peer group of small cap managers.

Small Cap Domestic Equity Excess Return and Risk

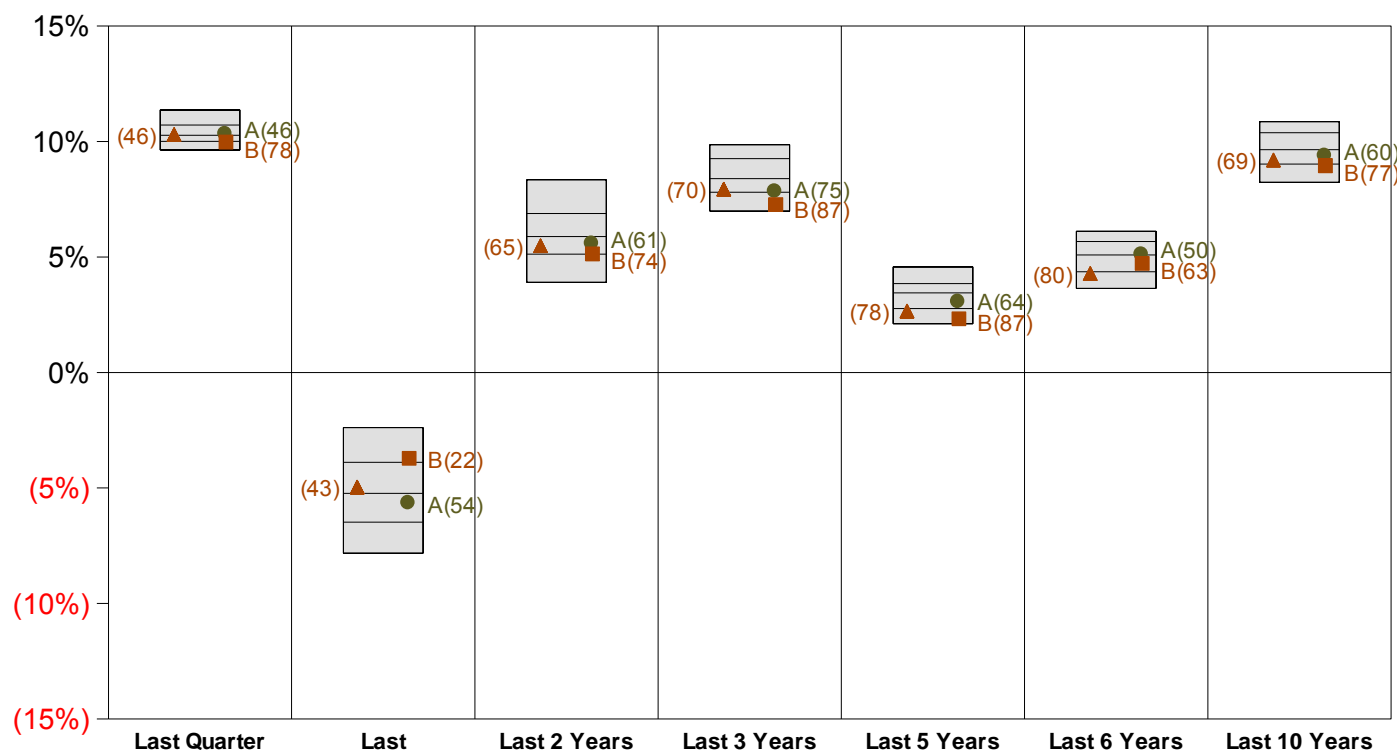
Risk Analysis vs. Callan Small Capitalization (Gross)
Five Years Ended March 31, 2019



- The Small Cap Domestic Equity Pool has outperformed the Russell 2000 Index over five years while exhibiting very tight tracking (low tracking error) to the benchmark relative to small cap peers.

International Equity through 3/31/19

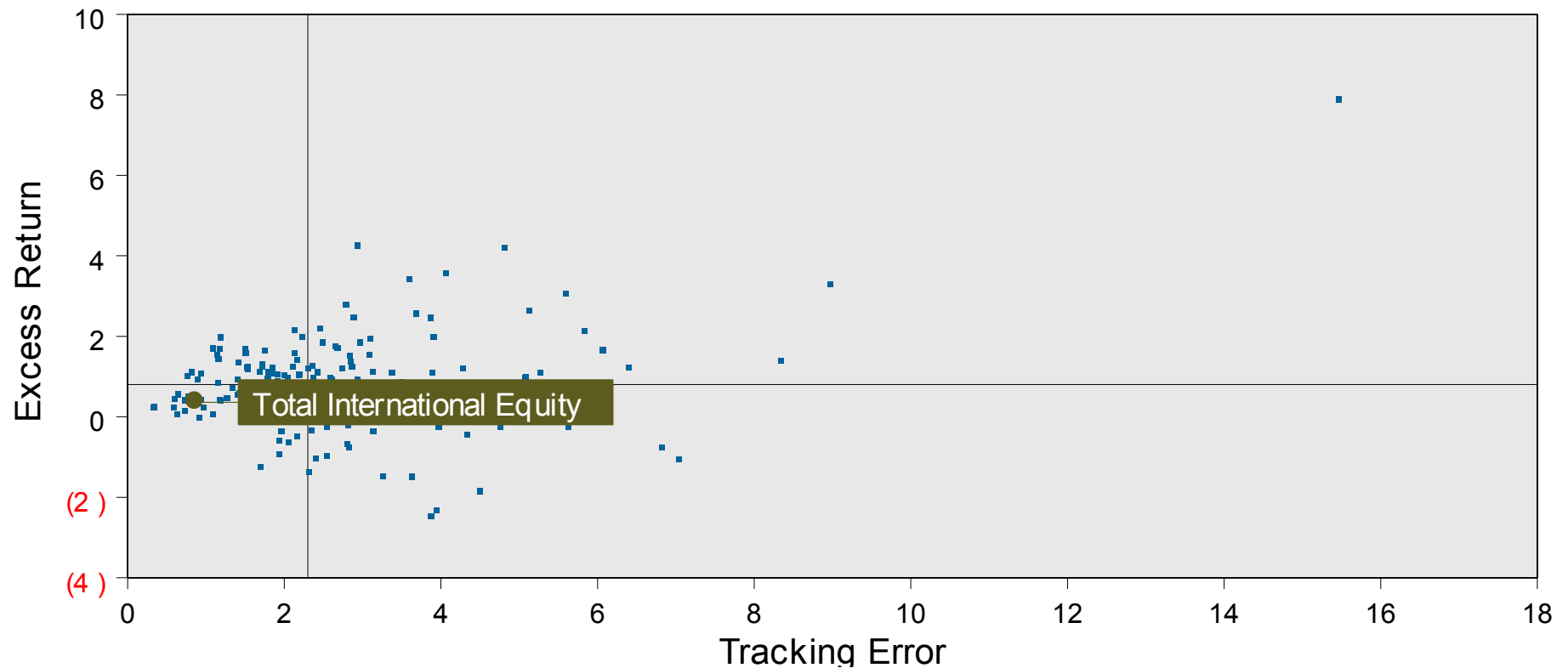
Performance vs Public Fund - International Equity (Gross)



10th Percentile	11.37	(2.39)	8.35	9.86	4.57	6.11	10.86
25th Percentile	10.72	(3.88)	6.89	9.26	3.85	5.67	10.39
Median	10.28	(5.24)	5.89	8.39	3.44	5.09	9.64
75th Percentile	10.01	(6.48)	5.13	7.81	2.77	4.36	9.02
90th Percentile	9.63	(7.83)	3.90	6.99	2.11	3.64	8.24
Total International Equity	● A 10.30	(5.68)	5.56	7.81	3.03	5.09	9.35
MSCI EAFE Index	■ B 9.98	(3.71)	5.14	7.27	2.33	4.72	8.96
MSCI ACWI ex US IMI	▲ 10.31	(4.96)	5.50	7.94	2.67	4.29	9.20

International Equity Excess Return and Risk

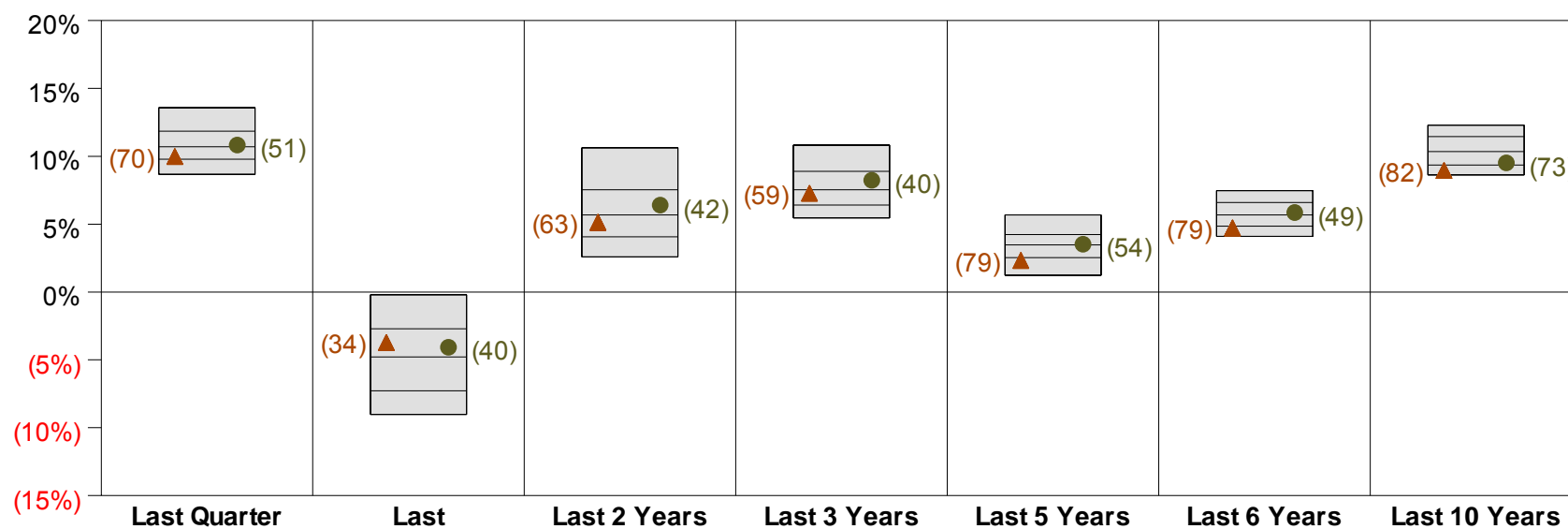
Risk Analysis vs. Public Fund – International Equity (Gross)
Five Years Ended March 31, 2019



- The Total International Equity portfolio has outperformed the MSCI ACWI ex US IMI over five years while exhibiting very tight tracking (low tracking error) to the benchmark relative to public fund peers.

International Equity ex Emerging Markets through 3/31/19

Performance vs Callan Non-US Equity (Gross)



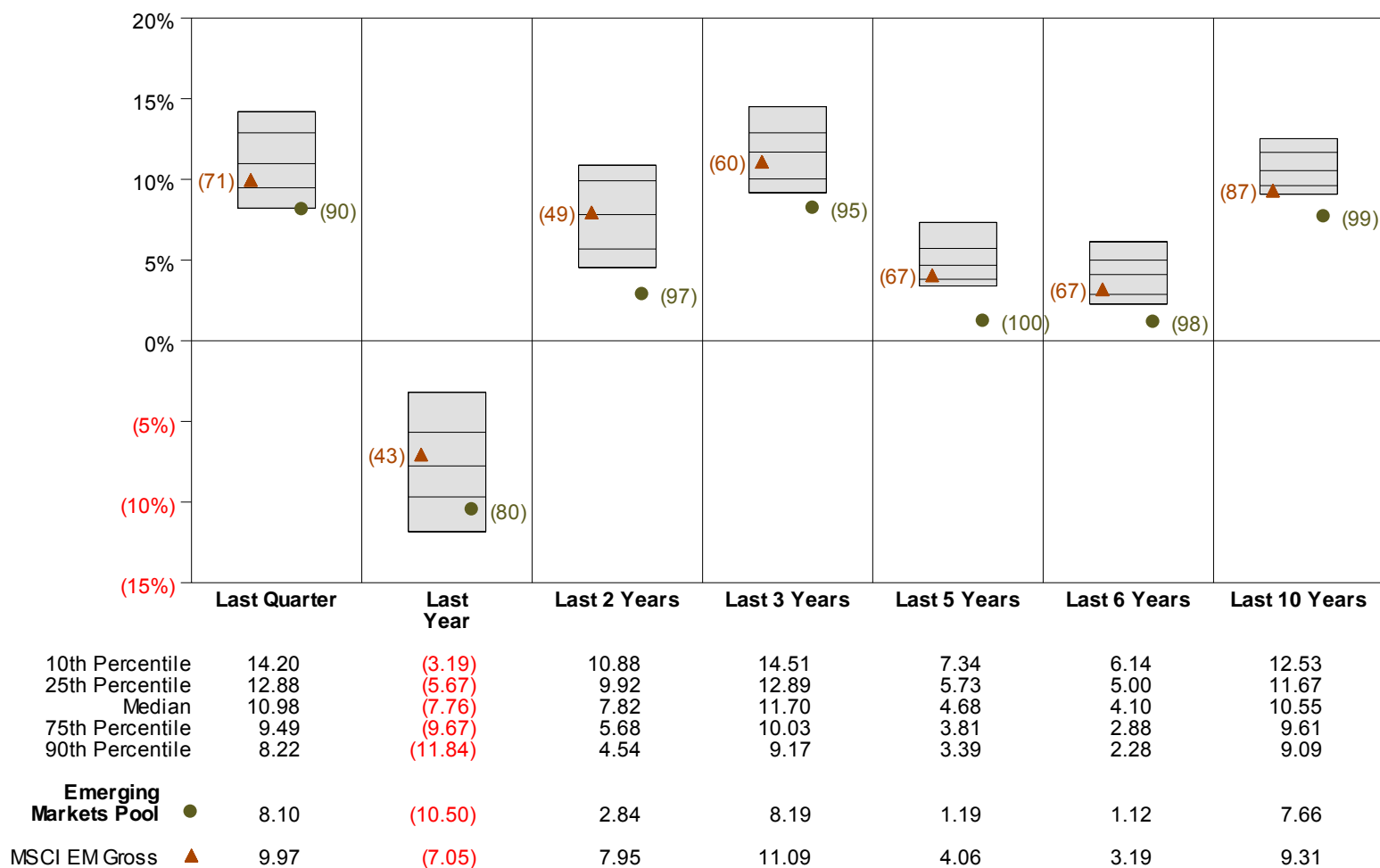
10th Percentile	13.59	(0.20)	10.63	10.82	5.68	7.47	12.29
25th Percentile	11.86	(2.70)	7.54	8.89	4.23	6.60	11.45
Median	10.71	(4.77)	5.67	7.54	3.46	5.68	10.34
75th Percentile	9.78	(7.28)	4.07	6.40	2.54	4.84	9.35
90th Percentile	8.67	(9.03)	2.59	5.46	1.23	4.09	8.63
Int'l Equity Pool (ex Emerging. Mkt)	● 10.69	(4.21)	6.26	8.09	3.39	5.73	9.37
MSCI EAFE	▲ 9.98	(3.71)	5.14	7.27	2.33	4.72	8.96

International Equity ex Emerging Markets through 3/31/19

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Int'l Equity Pool (ex Emerging Market)	10.69%	(4.21%)	8.09%	3.39%	9.37%
Arrowstreet ACWI ex -US	11.26%	(4.60%)	9.67%	-	-
Baillie Gifford ACWI ex US	13.40%	(4.52%)	8.06%	-	-
Blackrock ACWI ex US IMI	10.37%	(4.56%)	8.23%	2.91%	-
Brandes Investment	6.64%	(5.23%)	6.08%	2.59%	9.12%
Capital Guardian	15.93%	2.64%	12.08%	5.17%	10.80%
Lazard Asset Intl	9.64%	(5.65%)	5.89%	2.75%	9.29%
McKinley Capital	11.13%	(7.76%)	7.01%	4.56%	9.45%
Schroder Inv Mgmt	9.57%	(12.65%)	6.33%	4.15%	-
Mondrian Intl Sm Cap	10.04%	(3.82%)	7.54%	4.43%	-
MSCI EAFE Index	9.98%	(3.71%)	7.27%	2.33%	8.96%
MSCI ACWI ex-US IMI Index	10.31%	(4.96%)	7.94%	2.67%	9.20%

Emerging Markets through 3/31/19

Performance vs Callan Emerging Broad (Gross)



- After underperforming by 3.76% in 2Q17, 1.38% in 3Q17, 1.68% in 4Q17, 4.03% in 2Q18, and 1.87% in the current quarter, the Emerging Markets Pool lags the benchmark and ranks in the bottom quartile for all trailing periods shown.

Emerging Markets Pool through 3/31/19

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Emerging Markets Pool	8.10%	(10.50%)	8.19%	1.19%	7.66%
DRZ Emerging (net)	8.93%	(7.23%)	-	-	-
Lazard Emerging (net)	7.53%	(13.69%)	7.72%	0.87%	8.24%
MSCI Emerging Mkts Idx	9.97%	(7.05%)	11.09%	4.06%	9.31%

Total Fixed Income as of 3/31/19

Performance vs Public Fund - Domestic Fixed (Gross)



10th Percentile	4.22	5.09	4.19	4.51	4.38	3.98	7.15
25th Percentile	3.72	4.71	3.63	3.94	3.43	3.14	5.93
Median	3.27	4.46	3.10	2.84	3.07	2.59	4.80
75th Percentile	2.77	4.23	2.70	2.04	2.49	1.97	3.52
90th Percentile	2.37	3.83	2.48	1.72	2.16	1.68	2.52

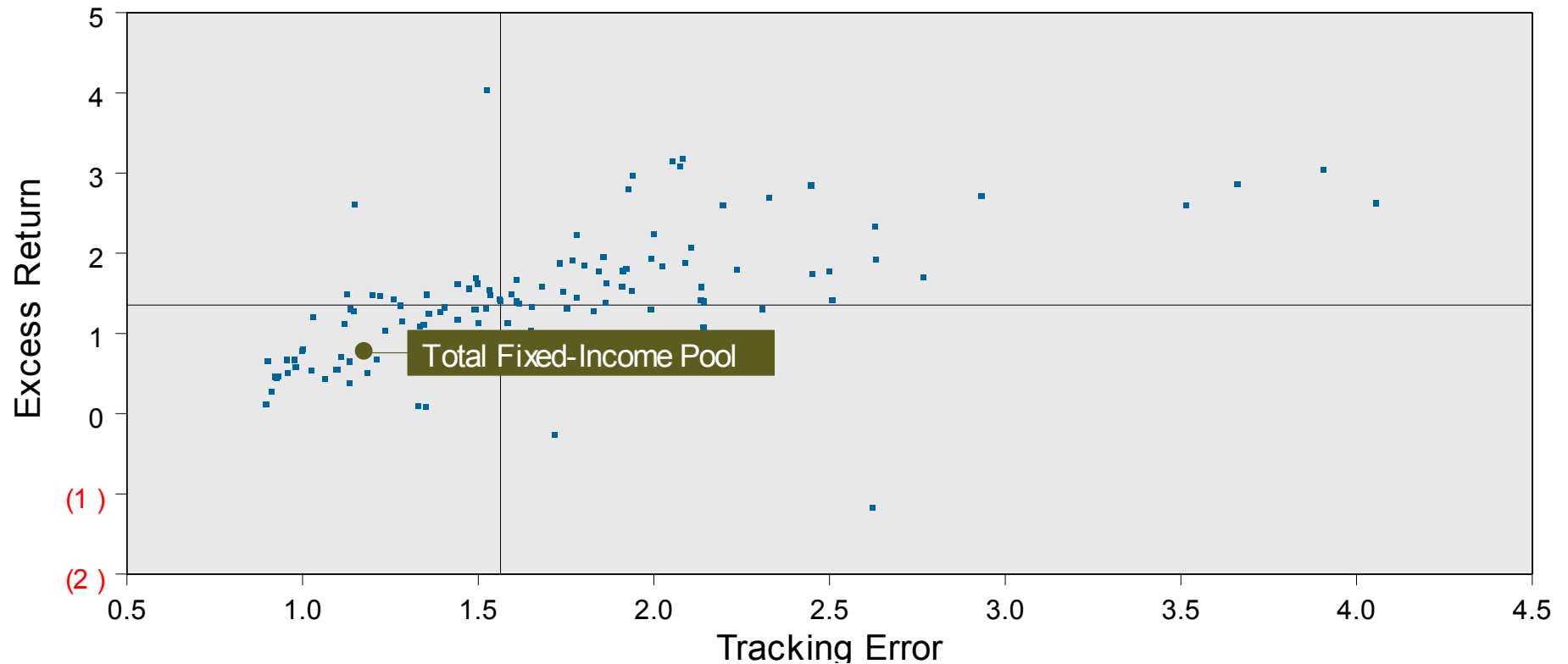
Total Fixed-Income Pool	●	1.74	3.93	2.37	2.90	2.47	2.22	4.27
Fixed-Income Target	▲	1.59	3.80	2.05	1.57	1.72	1.49	3.44

- The Total Bond portfolio has a custom target, intermediate in nature, that reflects a cautious view on the risk of rising rates.

Includes In-House and External Portfolios

Total Fixed Income Excess Return and Risk

Risk Analysis vs. Public Fund – Domestic Fixed (Gross)
Five Years Ended March 31, 2019



- The Total Fixed Income portfolio has outperformed the Fixed Income Target over five years and exhibits modest tracking error to the benchmark relative to public fund peers despite the custom nature of the benchmark.

Opportunistic through 3/31/19

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Opportunistic	6.26%	5.17%	-	-	-
Opportunistic Equity	8.06%	7.68%	8.77%	6.59%	-
ARMB STOXX Min Var	9.88%	11.96%	9.68%	-	-
Analytic SSgA/Buy Write	6.21%	4.29%	6.61%	6.23%	-
Russell 1000 Index	14.00%	9.30%	13.52%	10.63%	16.05%
Tactical Global	8.02%	-	-	-	-
PineBridge	7.11%	-	-	-	-
Fidelity Signals	8.91%	-	-	-	-
Taxable Muni Composite	5.05%	6.65%	5.45%	6.62%	-
Western Asset Taxable Muni	5.05%	6.83%	5.69%	6.92%	-
Blmbg Gov /Credit Bd	3.26%	4.48%	2.12%	2.78%	3.92%
Blmbg Aggregate Index	2.94%	4.48%	2.03%	2.74%	3.77%
Blmbg Intmtd Treas	1.59%	3.80%	0.95%	1.66%	1.98%
Blmbg Muni Tax Bd Idx	5.17%	5.54%	4.79%	6.06%	7.63%
International Fixed Income Pool	4.45%	(2.74%)	2.52%	0.22%	2.29%
Lazard Emerging Income	3.83%	(4.36%)	2.78%	0.10%	1.56%
Mondrian Investment Partners	4.86%	(1.66%)	3.24%	0.77%	2.92%
Citi Non-US Gvt Bd Idx	1.52%	(4.55%)	0.87%	(0.06%)	2.02%
Mondrian Benchmark	4.03%	(3.63%)	2.25%	0.16%	2.15%
Tactical FI					
FIAM Tactical Bond	5.35%	5.39%	6.00%	-	-
Schroders Insurance Linked	(0.88%)	(0.43%)	-	-	-
Blmbg Aggregate Index	2.94%	4.48%	2.03%	2.74%	3.77%
T-Bills + 6%	2.04%	8.12%	7.19%	6.75%	6.43%
High Yield	4.64%	6.61%	7.43%	4.76%	9.74%
FIAM High Yield CMBS	3.66%	6.92%	5.77%	-	-
MacKay Shields	6.22%	6.79%	10.07%	6.01%	10.50%
High Yield Target(1)	7.36%	7.70%	9.29%	5.05%	11.40%

(1) ML Hi Yield Master II from 12/31/06; ML Hi Yield Cash Pay prior to 12/31/06.

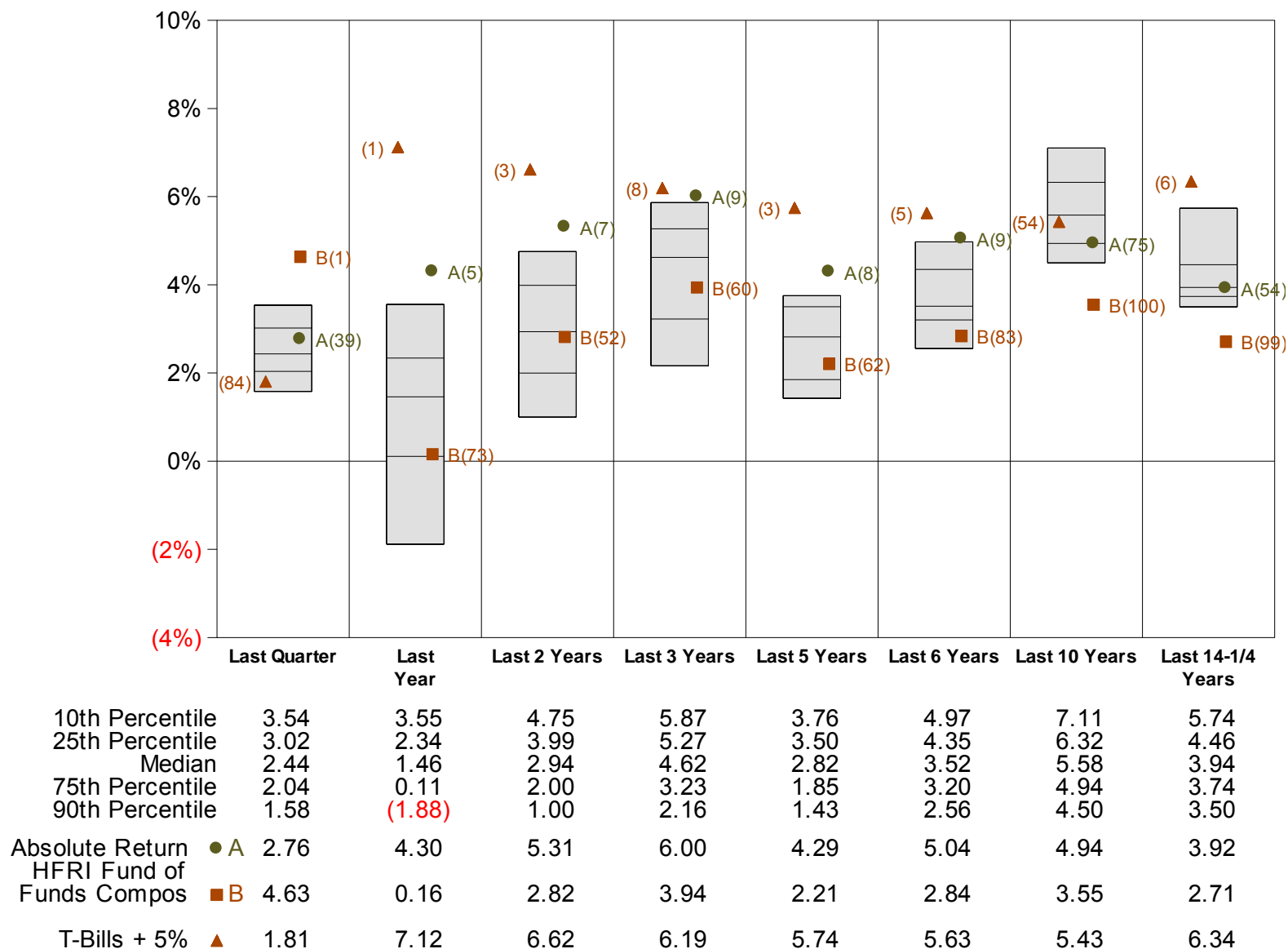
Real Assets through 3/31/19

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 6 Years
Real Assets	4.93%	8.05%	7.53%	6.34%	6.87%
Real Assets Target (1)	5.99%	8.71%	5.93%	7.16%	7.23%
Real Estate Pool	3.38%	8.58%	7.26%	9.43%	9.61%
Real Estate Target (2)	3.34%	8.27%	7.22%	9.29%	9.47%
Private Real Estate	1.68%	6.58%	7.29%	9.40%	9.75%
NCREIF Total Index	1.80%	6.83%	7.07%	9.13%	9.46%
ARMB REIT	17.08%	20.21%	7.62%	9.95%	8.83%
NAREIT Equity Index	17.17%	20.46%	7.84%	10.00%	8.84%
 Total Farmland	0.61%	3.99%	3.71%	4.59%	5.11%
UBS Farmland	1.05%	4.91%	4.21%	5.07%	5.73%
Hancock Agricultural	(0.31%)	2.06%	2.65%	3.54%	3.97%
ARMB Farmland Target (3)	1.30%	6.26%	5.77%	6.09%	6.95%
 Total Timber	0.60%	3.22%	2.64%	3.34%	4.30%
Timberland Investment Resources	(0.64%)	2.66%	2.66%	3.75%	4.21%
Hancock Timber	4.04%	4.74%	2.59%	2.34%	4.32%
NCREIF Timberland Index	0.11%	2.61%	3.35%	4.68%	5.51%
 Total Energy Funds *	(4.50%)	6.16%	7.10%	(5.70%)	(4.93%)
CPI + 5%	2.40%	6.77%	7.19%	6.28%	6.30%
 MLP Composite *	17.94%	11.12%	6.62%	(3.01%)	0.39%
Advisory Research (FKA FAMCO) MLP	7.71%	10.09%	6.46%	(4.19%)	(1.25%)
Tortoise Capital Adv MLP	18.06%	11.67%	6.67%	(2.01%)	1.84%
Alerian MLP Index	16.82%	15.11%	5.69%	(4.73%)	(2.64%)
 Total Infrastructure *	5.10%	12.28%	11.92%	7.98%	-
Brookfield	16.78%	13.48%	9.34%	4.57%	-
Lazard	10.79%	6.14%	11.22%	9.53%	-
JPM Infrastructure	1.11%	4.97%	6.81%	-	-
IFM Infrastructure	3.03%	18.31%	15.46%	-	-
Global Infrastructure Idx	14.06%	9.24%	8.66%	5.44%	7.27%

Real estate returns are provided to Callan by ARMB's real estate consultant.

Absolute Return Composite through 3/31/19

Performance vs Callan Absolute Rtn Hedge Fund of Funds (Net)



Absolute Return Composite through 3/31/19

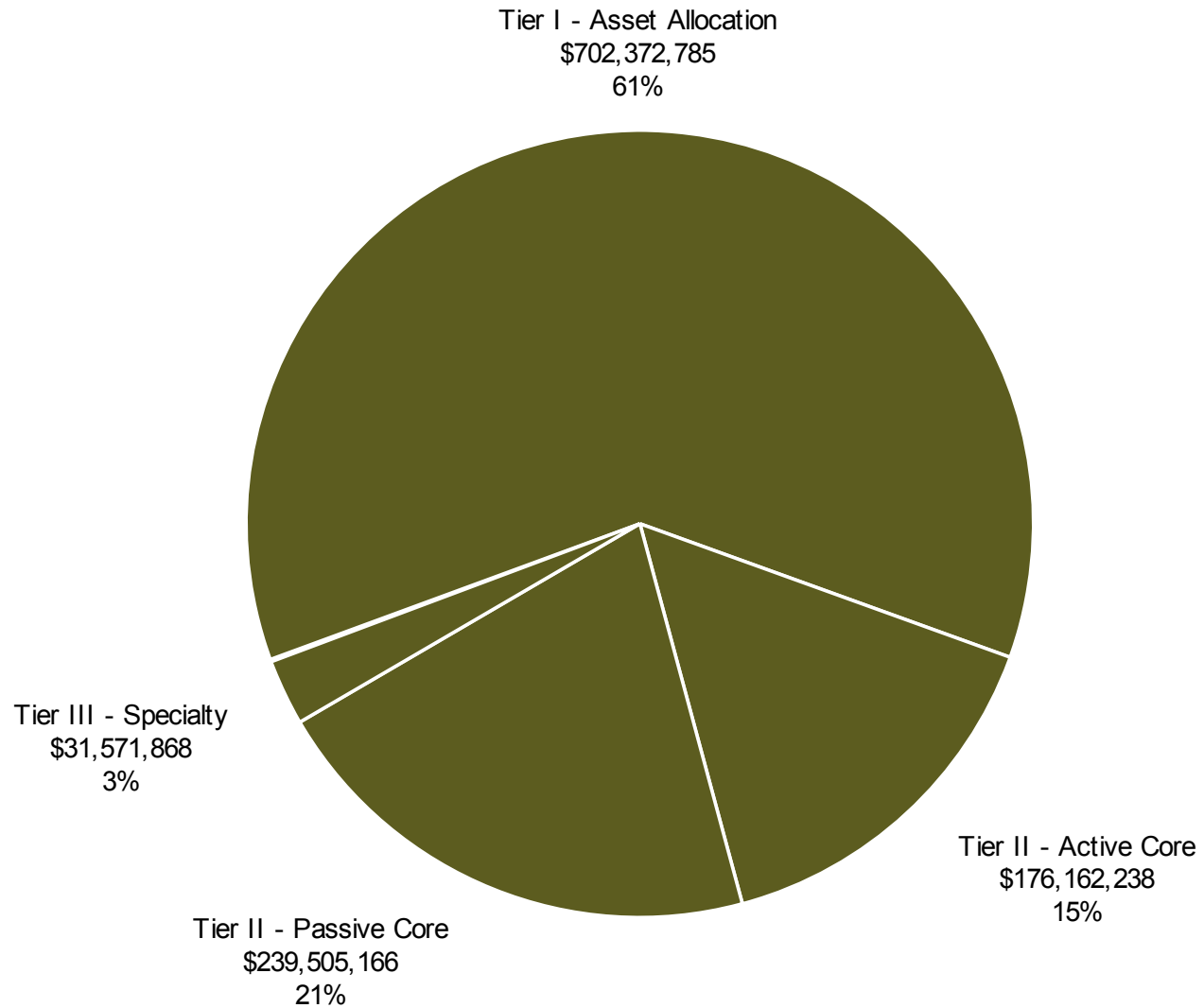
	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
Absolute Return	2.76%	4.30%	6.00%	4.29%	4.94%
Crestline ABS	0.00%	4.70%	8.14%	7.70%	6.82%
Prisma ABS	0.00%	(1.95%)	2.84%	1.36%	-
Allianz Structured Alpha 1000+	7.20%	10.45%	7.98%	-	-
Crestline Specialty Lending Fund	0.03%	9.40%	12.68%	-	-
Crestline Specialty Lending Fund II	0.14%	6.90%	-	-	-
Zebra Global Equity	(0.04%)	(0.33%)	-	-	-
Zebra Global Advantage	(1.53%)	(1.04%)	-	-	-
JP Morgan Systematic Alpha	1.01%	(5.39%)	-	-	-
Man Group Alternative Risk Premia	1.79%	(0.61%)	-	-	-
HFRI Fund of Funds Index	4.63%	0.16%	3.94%	2.21%	3.55%

Data on Crestline ABS and Prisma ABS has not yet been provided for the current quarter.

Defined Contribution Plan

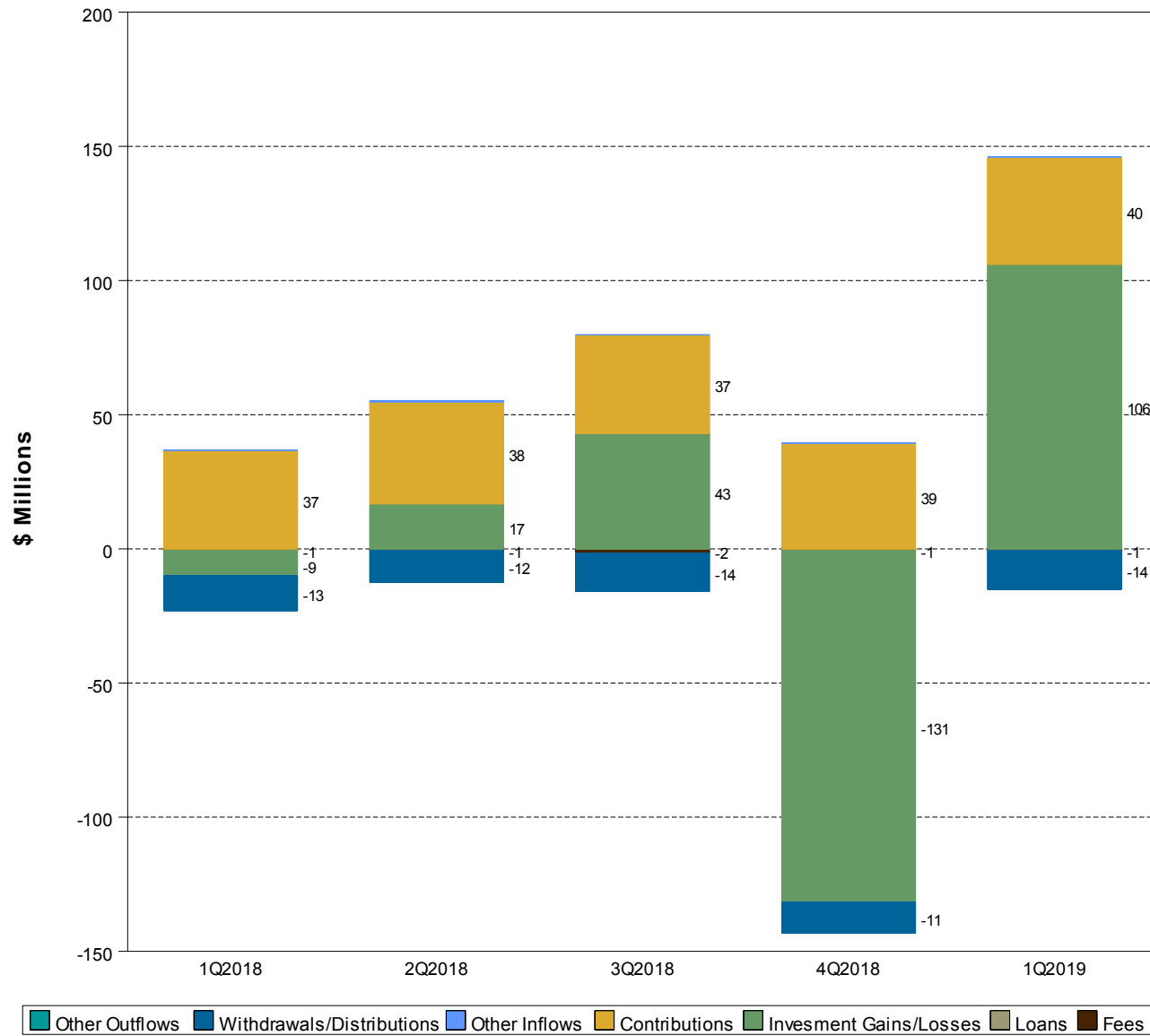
PERS DC Plan

March 31, 2019



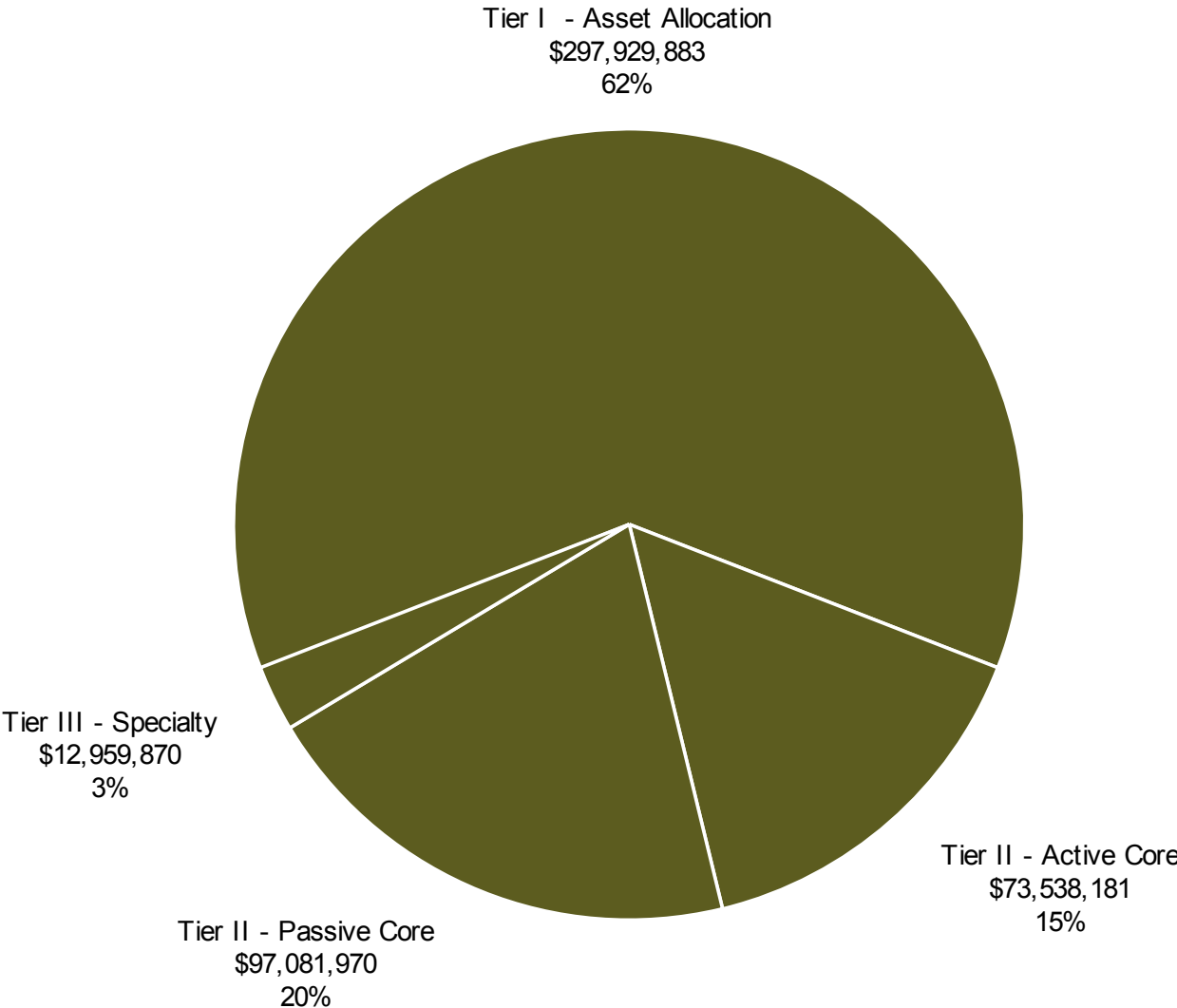
PERS DC Plan: Asset Changes

March 31, 2019



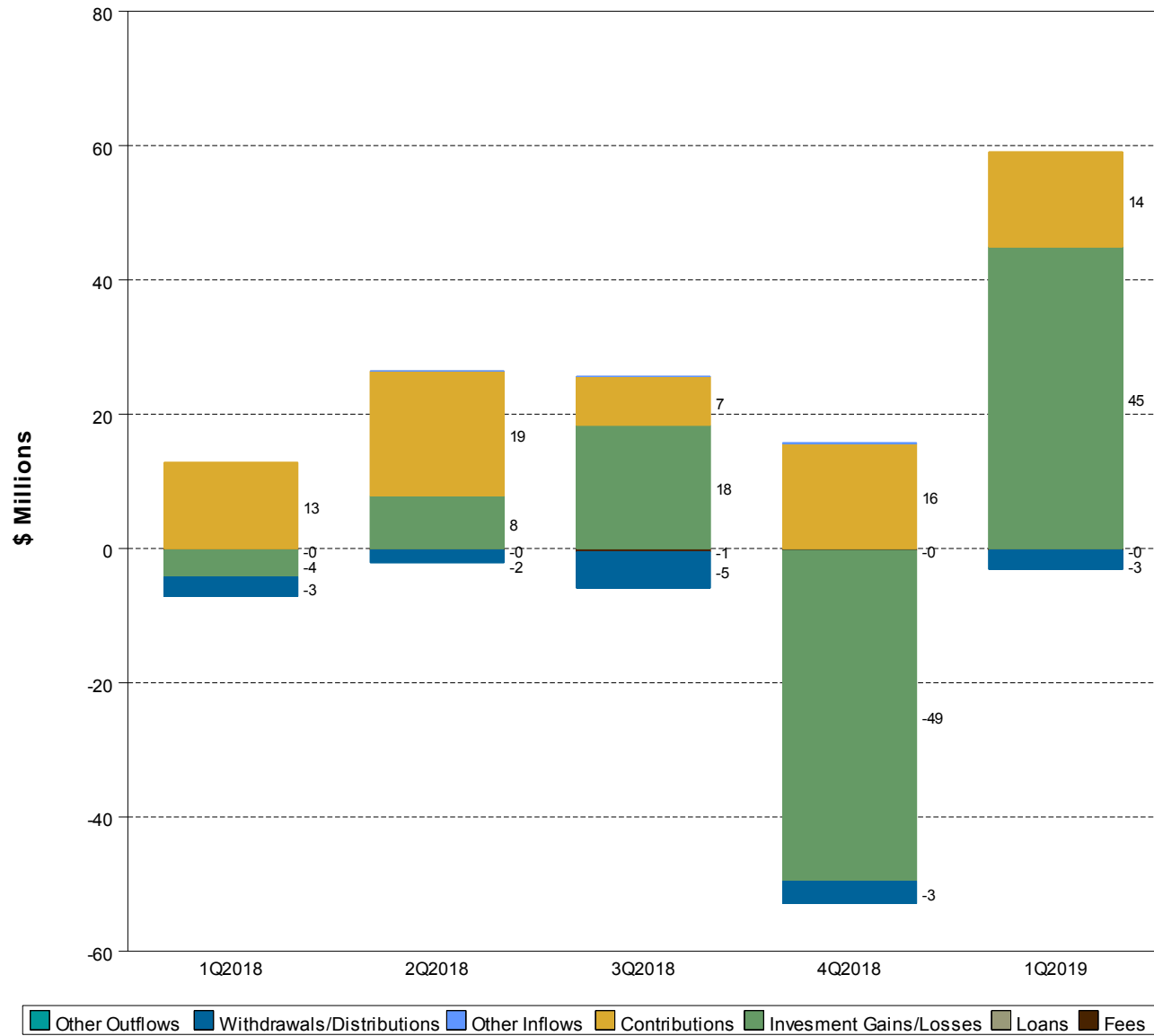
TRS DC Plan

March 31, 2019



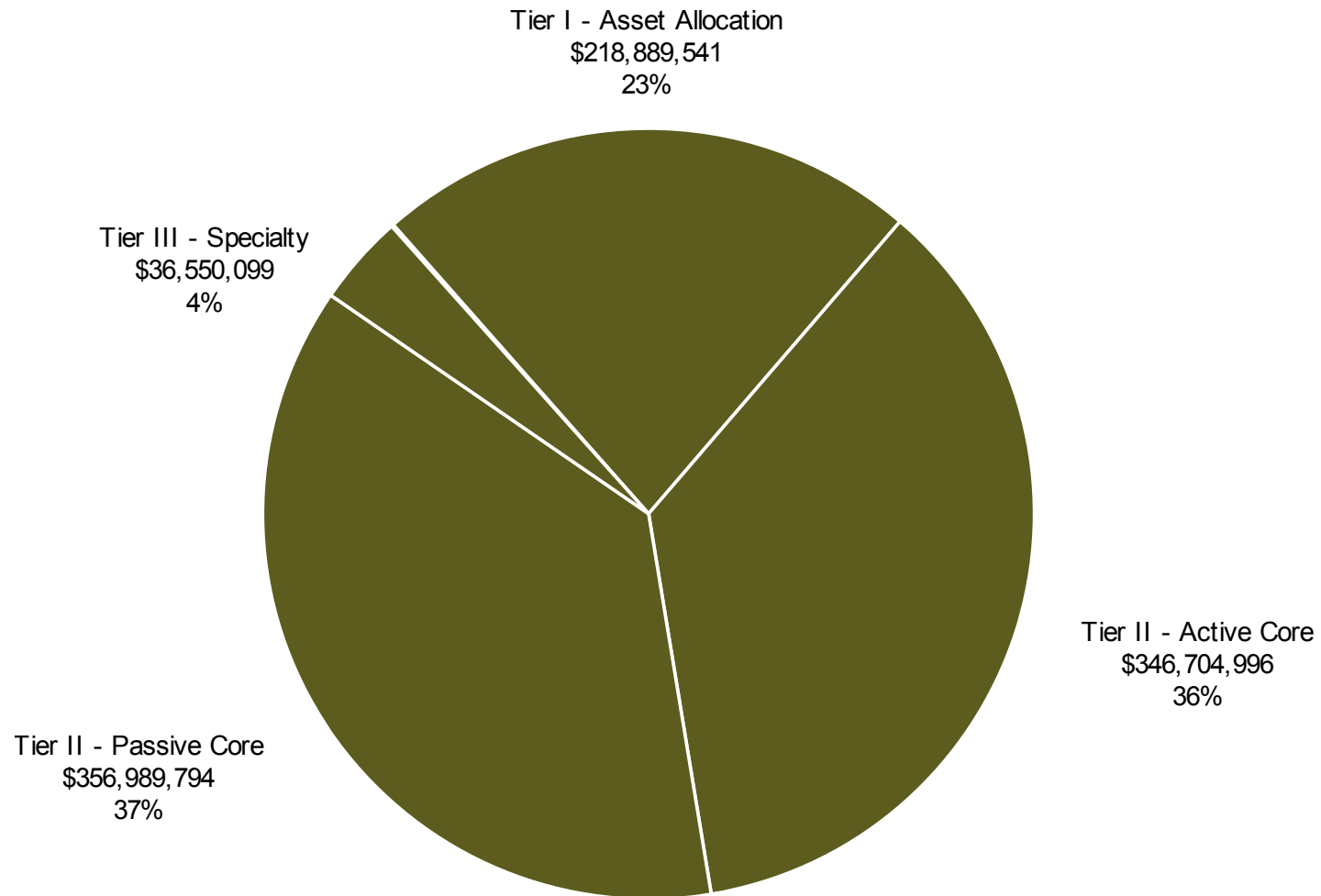
TRS DC Plan: Asset Changes

March 31, 2019



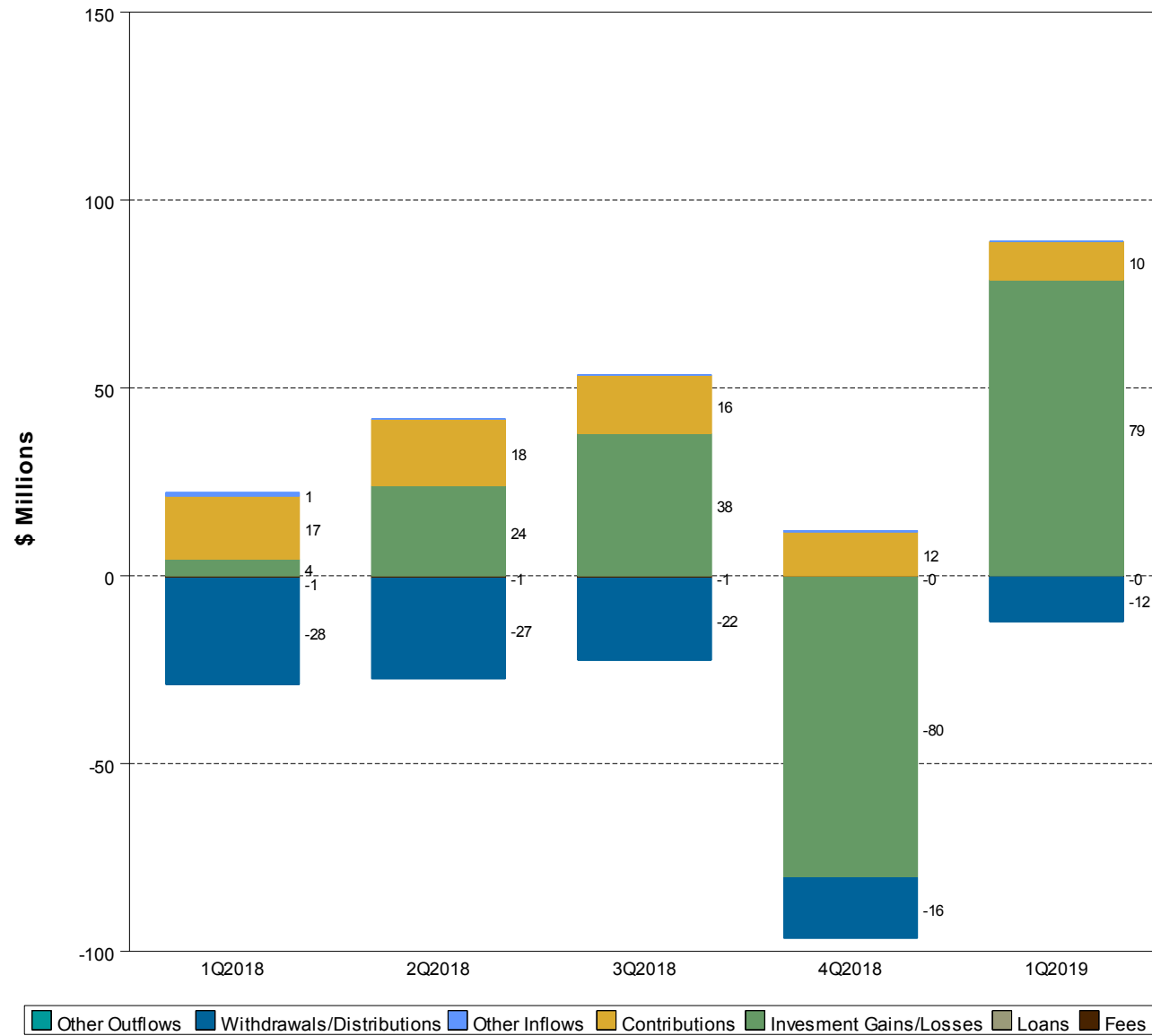
Deferred Comp Plan

March 31, 2019



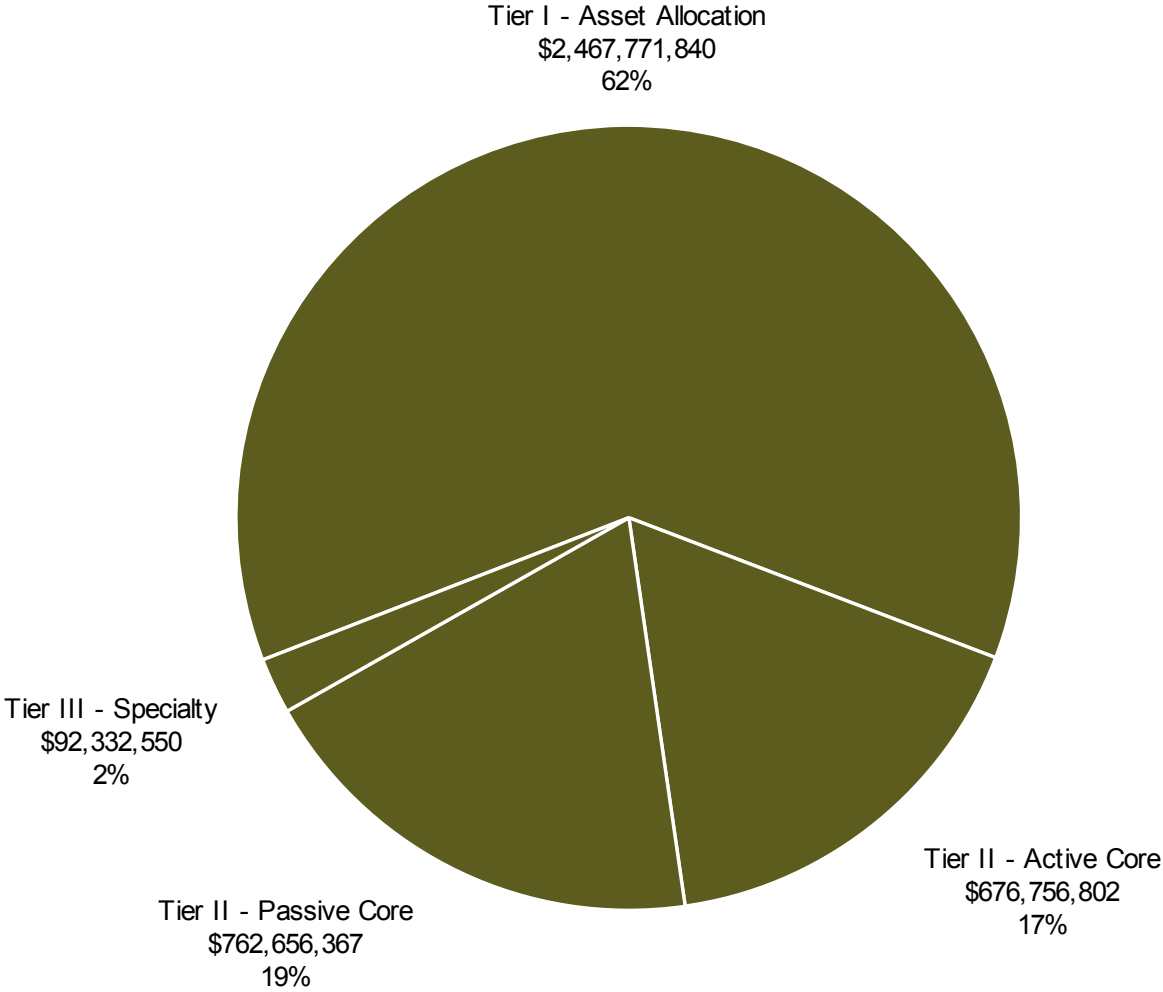
Deferred Comp Plan: Asset Changes

March 31, 2019



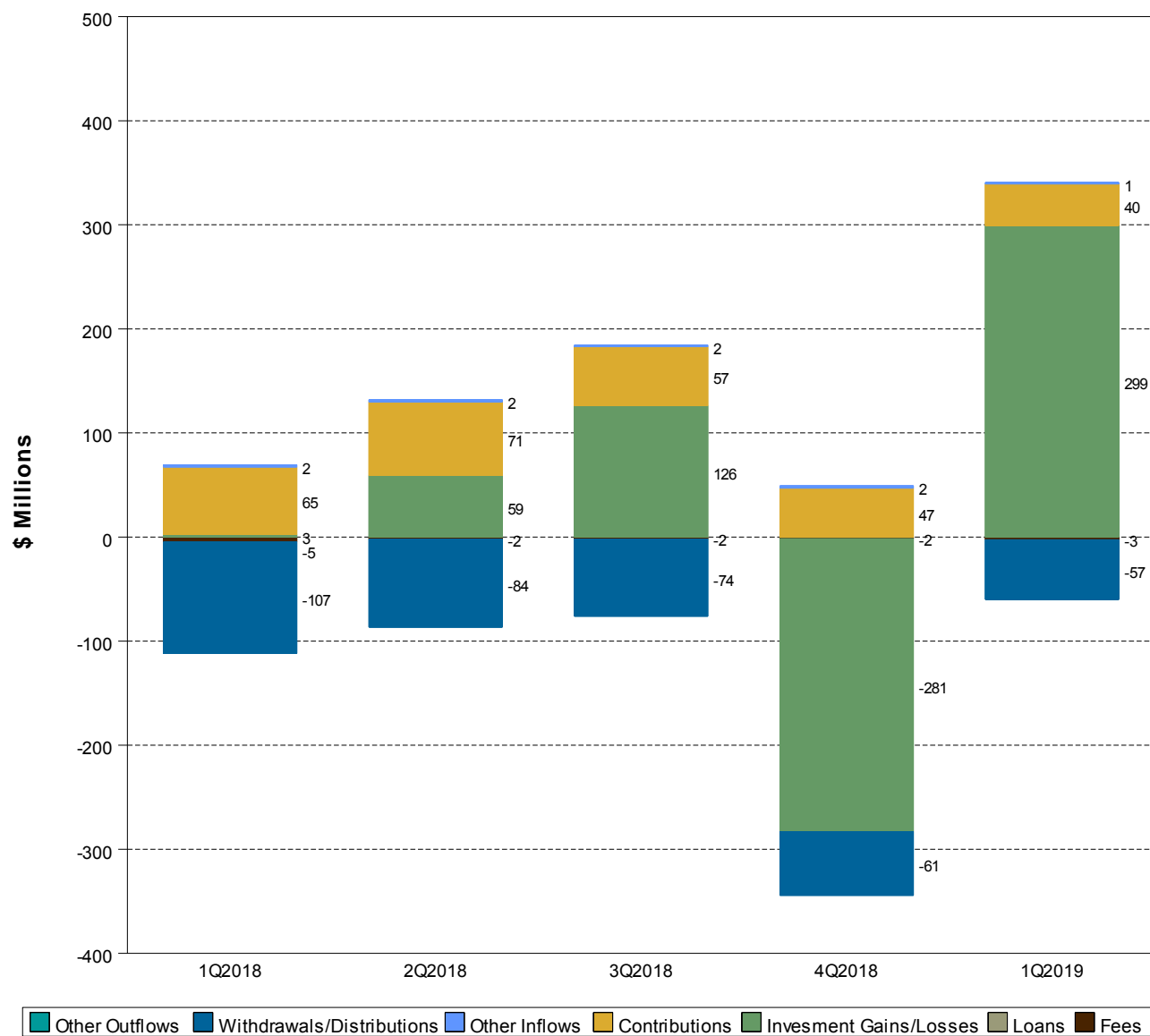
SBS Fund

March 31, 2019



SBS Fund: Asset Changes

March 31, 2019



Individual Account Option Performance: 3/31/19

Balanced & Target Date Funds

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Tier I - Asset Allocation										
Alaska Balanced Trust CAI MA Tgt Alloc Cons MFs Passive Target	5.8 53	4.4 22	5.3 34	4.4 22	5.3 28	4.1 80		-0.3 69	0.2 100	0.9 32
	5.9 50	4.6 20	5.4 33	4.5 22	5.3 30	4.2 71				0.9 35
Alaska Long-Term Balanced CAI MA Tgt Alloc Mod MFs Passive Target	8.4 48	4.4 33	7.8 28	5.8 23	7.4 20	6.6 61		-0.6 83	0.3 100	0.8 47
	8.6 44	4.8 29	8.0 24	5.9 20	7.4 20	6.8 58				0.8 45
Target 2010 Trust CAI Tgt Date 2010 Custom Index	6.3 50	4.1 34	6.1 44	4.7 38	6.1 24	4.9 64		-0.4 86	0.2 100	0.8 64
	6.4 42	4.4 26	6.2 39	4.8 36	6.1 20	5.0 61				0.8 64
Target 2015 Trust CAI Tgt Date 2015 Custom Index	7.1 39	4.3 29	7.1 23	5.3 18	7.0 8	5.7 49		-0.0 44	0.2 100	0.8 56
	7.2 38	4.5 20	7.1 22	5.3 18	7.0 8	5.8 44				0.8 65
Target 2020 Trust CAI Tgt Date 2020 Custom Index	8.2 15	4.4 19	8.1 11	6.0 7	7.8 3	6.7 26		-0.0 22	0.2 99	0.8 62
	8.3 14	4.7 13	8.1 10	6.0 7	7.8 3	6.8 20				0.8 66
Target 2025 Trust CAI Tgt Date 2025 Custom Index	9.2 15	4.5 15	8.9 8	6.4 6	8.5 4	7.6 21		-0.1 27	0.2 99	0.7 63
	9.3 14	4.8 8	9.0 8	6.5 6	8.5 4	7.7 19				0.7 65
Target 2030 Trust CAI Tgt Date 2030 Custom Index	10.1 17	4.6 17	9.6 15	6.9 10	9.1 6	8.4 26		-0.2 43	0.2 100	0.7 49
	10.2 16	4.9 7	9.8 13	6.9 9	9.1 6	8.5 25				0.7 54
Target 2035 Trust CAI Tgt Date 2035 Custom Index	10.9 21	4.6 14	10.3 15	7.2 11	9.6 5	9.1 41		-0.2 37	0.3 99	0.7 36
	10.9 20	4.9 8	10.4 15	7.3 10	9.6 4	9.2 35				0.7 38
Target 2040 Trust CAI Tgt Date 2040 Custom Index	11.4 27	4.6 14	10.7 16	7.5 8	9.9 5	9.7 42		-0.2 39	0.3 100	0.7 29
	11.5 26	4.9 8	10.9 11	7.5 7	9.9 4	9.8 39				0.7 32
Target 2045 Trust CAI Tgt Date 2045 Custom Index	11.8 32	4.6 13	10.9 15	7.6 8	10.0 5	9.9 66		-0.2 42	0.3 99	0.7 28
	11.9 28	5.0 7	11.1 9	7.6 7	10.0 4	10.0 43				0.7 29

Returns:
■ above median
■ third quartile
■ first quartile

Risk:
■ below median
■ second quartile
■ first quartile

Risk Quadrant:

 Return
 Risk

Excess Return Ratio:
■ above median
■ third quartile
■ fourth quartile

Tracking Error:
■ below median
■ second quartile
■ first quartile

Sharpe Ratio:
■ above median
■ third quartile
■ fourth quartile

Individual Account Option Performance: 3/31/19

Balanced & Target Date Funds

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Target 2050 Trust CAI Tgt Date 2050 Custom Index	11.8 40	4.6 12	10.9 16	7.6 8	10.0 4	9.9 66		-0.2 49	0.3 100	0.7 28
	11.9 38	5.0 5	11.1 9	7.6 7	10.0 4	10.0 56				0.7 29
Target 2055 Trust CAI Tgt Date 2055 Custom Index	11.8 47	4.6 12	10.9 19	7.6 10	10.0 9	9.9 76		-0.2 49	0.3 100	0.7 29
	11.9 45	5.0 5	11.1 11	7.6 9	10.0 8	10.0 63				0.7 29
Target 2060 Trust CAI Tgt Date 2060 Custom Index	11.8 48	4.6 12	10.8 26						0.3 100	
	11.9 48	5.0 7	11.1 15							

Returns:

■ above median
■ third quartile
■ fourth quartile

Risk:

■ below median
■ second quartile
■ first quartile

Risk Quadrant:



Excess Return Ratio:

■ above median
■ third quartile
■ fourth quartile

Tracking Error:

■ below median
■ second quartile
■ first quartile

Sharpe Ratio:

■ above median
■ third quartile
■ fourth quartile

Other Options: 3/31/19

Passive Strategies

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Index Funds										
SSgA S&P 500 Index Fund (i) Callan S&P 500 Index MFs S&P 500 Index	13.6 19	9.5 14	13.5 11	10.9 8	12.8 2	11.1 29		-0.7 5	0.0 78	0.9 8
	13.6 15	9.5 8	13.5 8	10.9 1	12.8 1	11.1 40				0.9 1
BlackRock S&P 500 Index Fund (i) Callan S&P 500 Index MFs S&P 500 Index	13.7 3	9.5 6	13.5 9	10.9 8	12.8 1	11.1 15		-0.8 5	0.0 77	0.9 12
	13.6 15	9.5 8	13.5 8	10.9 1	12.8 1	11.1 40				0.9 1
SSgA Russell 3000 Index Fund (i) CAI Mut Fd: Large Cap Broad Style (Net) Russell 3000 Index	14.0 49	8.7 48	13.5 45	10.4 44	12.6 38	11.4 65		0.3 36	0.0 100	0.8 38
	14.0 49	8.8 48	13.5 45	10.4 44	12.6 38	11.4 65				0.8 38
SSgA World Equity ex-US Index Fund (i) CAI MF: Non-U.S. Equity Style MSCI ACWI x U.S. Index (Net)	10.3 53	-4.4 36	8.3 28	2.7 43	4.8 74	12.0 71		0.2 28	0.7 99	0.2 39
	10.3 53	-4.2 35	8.1 29	2.6 47	4.7 75	12.0 71				0.2 40
BlackRock Passive US Bd Index Fund (i) Callan Core Bond MFs Blmbg Aggregate	3.0 68									0.6 53
	2.9 71	4.5 44	2.0 85	2.7 38	2.5 74	3.1 38				
SSgA US TIPS (i) CAI TIPS MFs Blmbg U.S. TIPS Index	3.2 60	2.7 20	1.6 63	1.9 25	1.1 37	3.7 58		-2.9 98	0.0 100	0.3 21
	3.2 60	2.7 17	1.7 52	1.9 22	1.2 29	3.7 57				0.3 13
SSgA US REIT Index Fund (i) CAI Mut Fd: Real Estate Database DJ US Select REIT Index	15.6 76	19.7 16	5.2 65	8.8 46	8.6 52	13.6 36		-1.9 98	0.1 100	0.6 50
	15.7 73	19.7 15	5.3 60	8.9 44	8.9 40	13.6 31				0.6 46

Returns:
■ above median
■ third quartile
■ fourth quartile

Risk:
■ below median
■ second quartile
■ first quartile

Risk Quadrant:

 Return
 Risk

Excess Return Ratio:
■ above median
■ third quartile
■ fourth quartile

Tracking Error:
■ below median
■ second quartile
■ first quartile

Sharpe Ratio:
■ above median
■ third quartile
■ fourth quartile

(i) – Indexed scoring method used. Green: manager & index ranking differ by less than +/- 10 percentiles; Yellow: manager and index ranking differ by +/- 20 percentiles; Red: manager & index ranking differ by more than 20 percentiles.

Other Options: 3/31/19

Active Equity, Stable Value, and Money Market

Investment Manager	Last Quarter Return	Last Year Return	3 Year Return	5 Year Return	7 Year Return	5 Year Risk	5 Year Risk Quadrant	5 Year Excess Rtn Ratio	3 Year Tracking Error	5 Year Sharpe Ratio
Active and Other Funds										
Northern Trust ESG Fund	13.5 52									
Callan Lg Cap Broad MF										
MSCI USA ESG	13.6 52	10.3 38	13.3 47	10.0 47	12.3 46	10.3 89				0.9 28
International Equity Fund	10.3 53	-7.6 72	4.3 91						2.9 72	
CAI Mut Fd: Non-U.S. Equity Style										
MSCI ACWI ex US Index	10.4 51	-3.7 29	8.6 19	3.0 33	5.2 56	12.0 69				0.2 31
T. Rowe Price Small Cap	17.6 33	11.9 17	16.3 31	9.9 18	13.2 14	14.3 82		0.9 2	4.0 88	0.6 8
CAI Mut Fd: Sm Cap Broad Style										
Russell 2000 Index	14.6 56	2.0 55	12.9 47	7.1 50	10.7 48	15.7 54				0.4 52
T. Rowe Price Stable Value	0.7 1	2.5 7	2.4 1	2.4 1	2.5 1	0.1 95		11.4 9	0.1 9	27.2 1
Callan Stable Value CT										
5 Yr U.S. Treas Rolling	0.4 78	1.7 83	1.5 81	1.4 59	1.5 49	0.1 83				7.9 32
SSgA Inst Treasury Money Market	0.6 9	2.0 9	1.1 9	0.7 11	0.5 14	0.4 6		-3.4 100	0.0 92	-0.2 11
Callan Money Market Funds										
FTSE 3 Mo T-Bill	0.6 5	2.1 5	1.2 3	0.7 2	0.5 2	0.4 2				-0.1 2

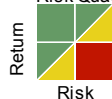
Returns:

■ above median
■ third quartile
■ fourth quartile

Risk:

■ below median
■ second quartile
■ first quartile

Risk Quadrant:



Excess Return Ratio:

■ above median
■ third quartile
■ fourth quartile

Tracking Error:

■ below median
■ second quartile
■ first quartile

Sharpe Ratio:

■ above median
■ third quartile
■ fourth quartile

Callan

Callan Update

Published Research Highlights from 1Q19

Callan's 2019–2028 Capital Market Projections

0.80	0.80	0.99	1.00						
0.86	0.86	0.94	0.88	1.00					
-0.22	-0.26	-0.25	-0.23	-0.28	1.00				
-0.10	-0.15	-0.14	-0.12	-0.17	0.88	1.00			
0.11	0.10	0.08	0.09	0.04	0.74	0.93	1		
-0.04	-0.08	-0.06	-0.05	-0.09	0.56	0.64	0		
0.63	0.62	0.63	0.61	0.62	-0.13	0.02	0		
0.01	0.00	0.07	0.05	0.10	0.48	0.53	0		
0.57	0.55	0.57	0.54	0.58	-0.04	0.10	0		
0.73	0.72	0.71	0.68	0.70	-0.13	-0.04	0		
0.92	0.88	0.88	0.86	0.86	-0.30	-0.23	-0		

2019 DC Trends Survey



The Callan Periodic Table Collection: Year-End 2018

Large Funds	Real Estate Funds	Non-U.S.
13.13%	13.95%	2.7%
High Yield	Large Cap Equity	U.S.
2.45%	1.38%	2.6%
2014: 0.76%	2015: 0.73%	2016:
Equivalent	U.S. Fixed	Non-U.S.
0.04%	0.55%	1.4%
Emerging Markets	Cash Equivalent	Hedge
2.19%	0.05%	1.2%
U.S. Fixed	Hedge Funds	Cash E
2.99%	0.71%	0.4%

Two Questions to Help DC Plans Save on Litigation Costs



Popular Blog Posts

How DTS Helps Us Evaluate Bonds

Kevin Machiz

Securities Lending 101

Kyle Fekete and Mark Kinoshita

A Look at the New Communication Services Sector

Irina Sushch

Additional Reading

Private Equity Trends quarterly newsletter
Active vs. Passive quarterly charts
Capital Market Review quarterly newsletter
 Monthly Updates to the Periodic Table
Market Pulse Flipbook quarterly markets update

Callan Institute Events

Upcoming Conferences, Workshops, and Webinars

2019 October Regional Workshops

- Denver, October 22, 2019
- Chicago, October 24, 2019

“Callan College”—Ongoing fiduciary education

Introduction to Investments sessions

- San Francisco, July 16–17, 2019
- Chicago, October 22–23, 2019
- Atlanta, TBD

Alternative Investments session

- Chicago, October TBD

Recent Webinar:

- Cobbler’s Shoes Webinar, June 18, 2019, 11am PST

Webinars: On-Demand now available at
<https://www.callan.com/ondemandwebinar/>

Our library of pre-recorded webinars on specific investment-related topics, such as:

- ESG Adoption and Implementation Trends
- Infrastructure: Real Perspectives on an Evolving Asset Class
- Investigating Private Equity Implementation

“Research is the foundation of all we do at Callan, and sharing our best thinking with the investment community is our way of helping to foster dialogue to raise the bar across the industry.”

— Greg Allen, CEO, Chief Research Officer



Callan Updates

Firm updates by the numbers, as of March 31, 2019

Total Associates: 191

Ownership

- 100% employees
- Broadly distributed across more than 95 shareholders

Leadership Changes

- No executive additions or departures
- Added Pete Keliuotis, head of Alternatives Consulting
- Executive Chairman Ron Peyton completes his 45th year at Callan

Total General and Fund Sponsor Consultants: more than 45

Total Specialty and Research Consultants: more than 60

Total CFA/CAIA/FRMs: more than 50

Total Fund Sponsor Clients: more than 400

AUA: more than \$2.4 trillion

“The Callan culture that we have all built together over the years is the reason we like coming to work each day..... Our culture of supporting and caring about each other, of appreciating and respecting each other while still having some fun and good humor has been the key to our longevity and success. We never want to diminish it.”

— Ron Peyton, Executive Chairman





Alaska Retirement Management Board

Annual Fiduciary Training

Objectives

- Establish a baseline
- Satisfy statutory requirements
- Provide context for the work of the board
- Identify topics for additional board and individual training

Fiduciary Duty

- Sources
 - Statutory
 - Common Law
 - ARMB not subject to ERISA, but will likely be used by analogy
- Definition: One who transacts business, and handles money and property, not for self-interest, but for the benefit of another, “implying and necessitating great confidence and trust, and a high degree of good faith”

Statutory Sources

- AS 37.10.071(c): “the fiduciary of a state fund shall apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the fund entrusted to the fiduciary. Among beneficiaries of a fund, the fiduciaries shall treat beneficiaries with impartiality.”

Statutory Sources

- AS 37.10.210(a): “Consistent with standards of prudence, the board has the fiduciary obligation to manage and invest these assets in a manner that is sufficient to meet the liabilities and pension obligations of the systems, plan, program, and trusts.”

Unpacking the Statutes

- No ideal prudent behavior for all situations and times
- Depends on purpose of invested funds
- Objective and subjective components
- Can rely on expert advisors or delegate

Unpacking the Statutes

- Applies to all funds managed by ARMB, even self-directed defined contribution plans
- Isn't fire-and-forget
- "Sole financial best interest" isn't defined in statute but historically has excluded decisional factors that implement public policy, but that do not directly impact financial outcomes for beneficiaries

Isn't This Impossible for a Part-Time Board?

- Yes, without assistance
- The legislature provided ARMB with staff, the IAC, and authority to engage managers, consultants, and other professionals

Now What?

- Process – have it, follow it, refine it
 - Structure/governance
 - Policies
 - Procedures
 - Compliance
 - Reporting
 - Obtain and use resources
- Think of process as organism, not artifact

Delegation

- Safe Harbor
 - Statutory delegations (e.g., staff)
 - Prudent delegations
- Exceptions
 - Participates in or conceals a breach
 - Enables a breach
 - Knows about a breach and does not attempt to remedy

Delegation Nuances

- Scope of delegation
- Direct private equity investment \neq delegation
- Some seemingly non-discretionary functions (e.g., custody and depositary) are subject to the prudent investor rule
- Consultants, attorneys, and advisors have professional duties but may not be fiduciaries

Reconciling Individual and Collective Duty

- Do Trustees “represent” constituents?
- Courts recognize decision makers have diverse life experience
- Interests are often aligned, but statute controls in event of conflict

Conclusion

- Trustees have enormous responsibility
- “[Person’s] got to know [their] limitations”
- Use resources
- When in doubt, ask
- Questions?

ALASKA RETIREMENT MANAGEMENT BOARD

Asset Allocation

Bob Mitchell, CFA
Chief Investment Officer
June 20-21, 2019

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

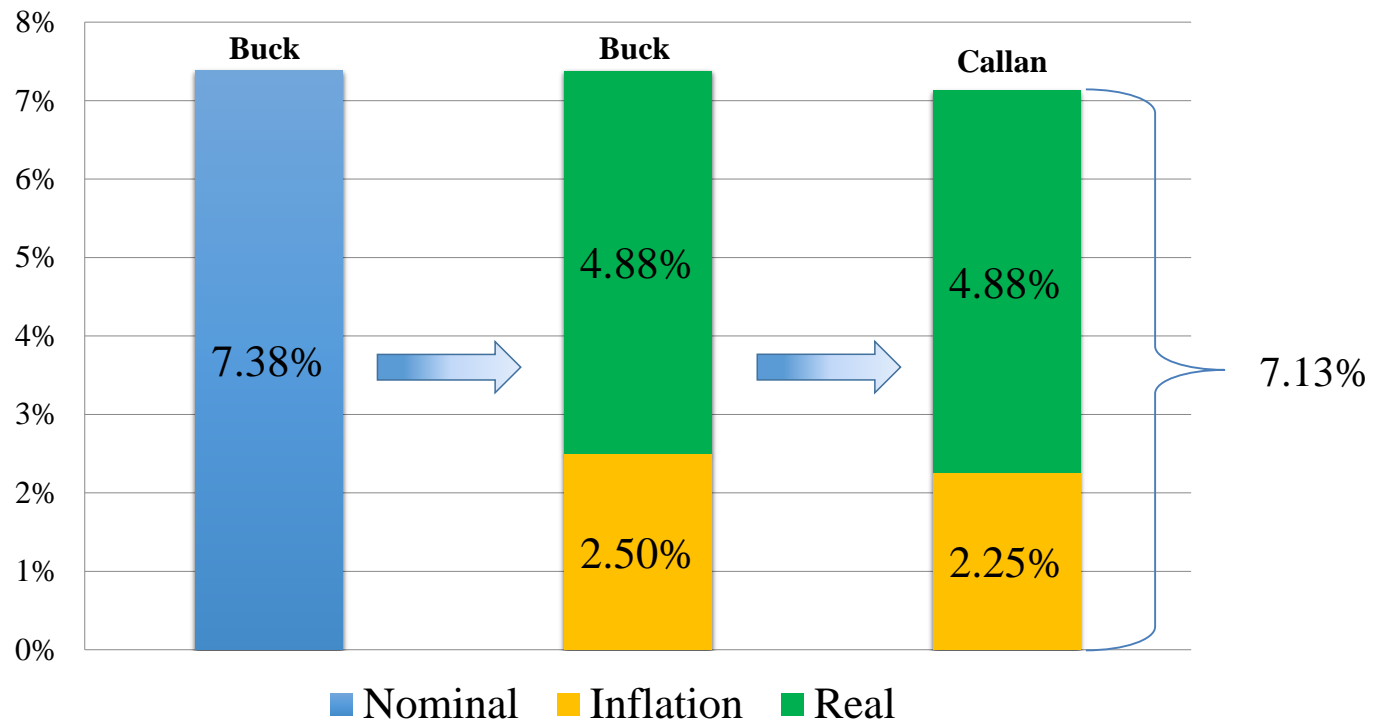
Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

Fund's Purpose

Achieve the “expected long-term total return, as determined by the actuarially-required rate of return, while minimizing risk as determined by the projected standard deviation of the range of potential future returns.”

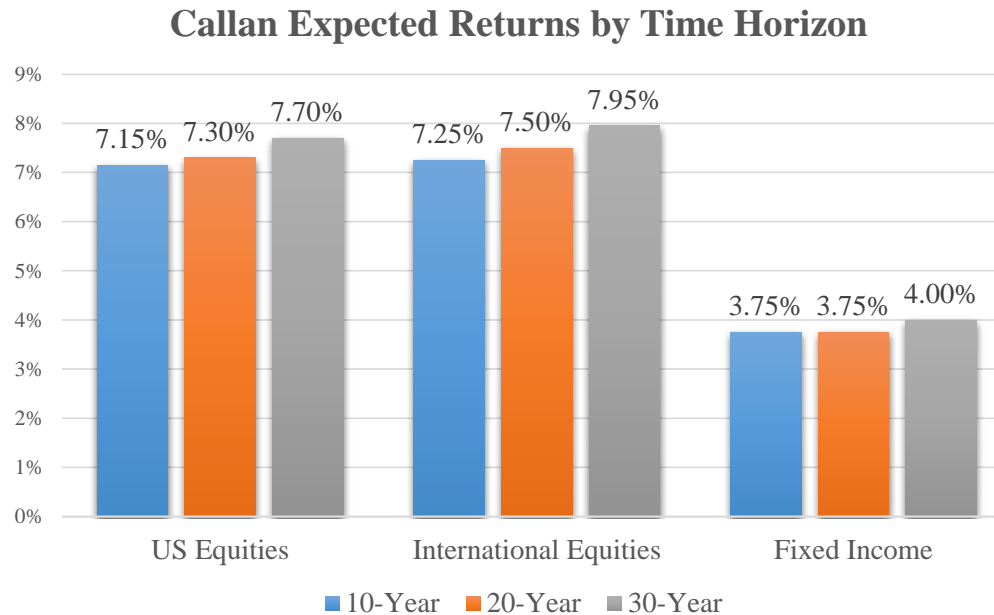
– ARMB Policy & Procedures Manual



Strategic Asset Allocation – Basic Elements

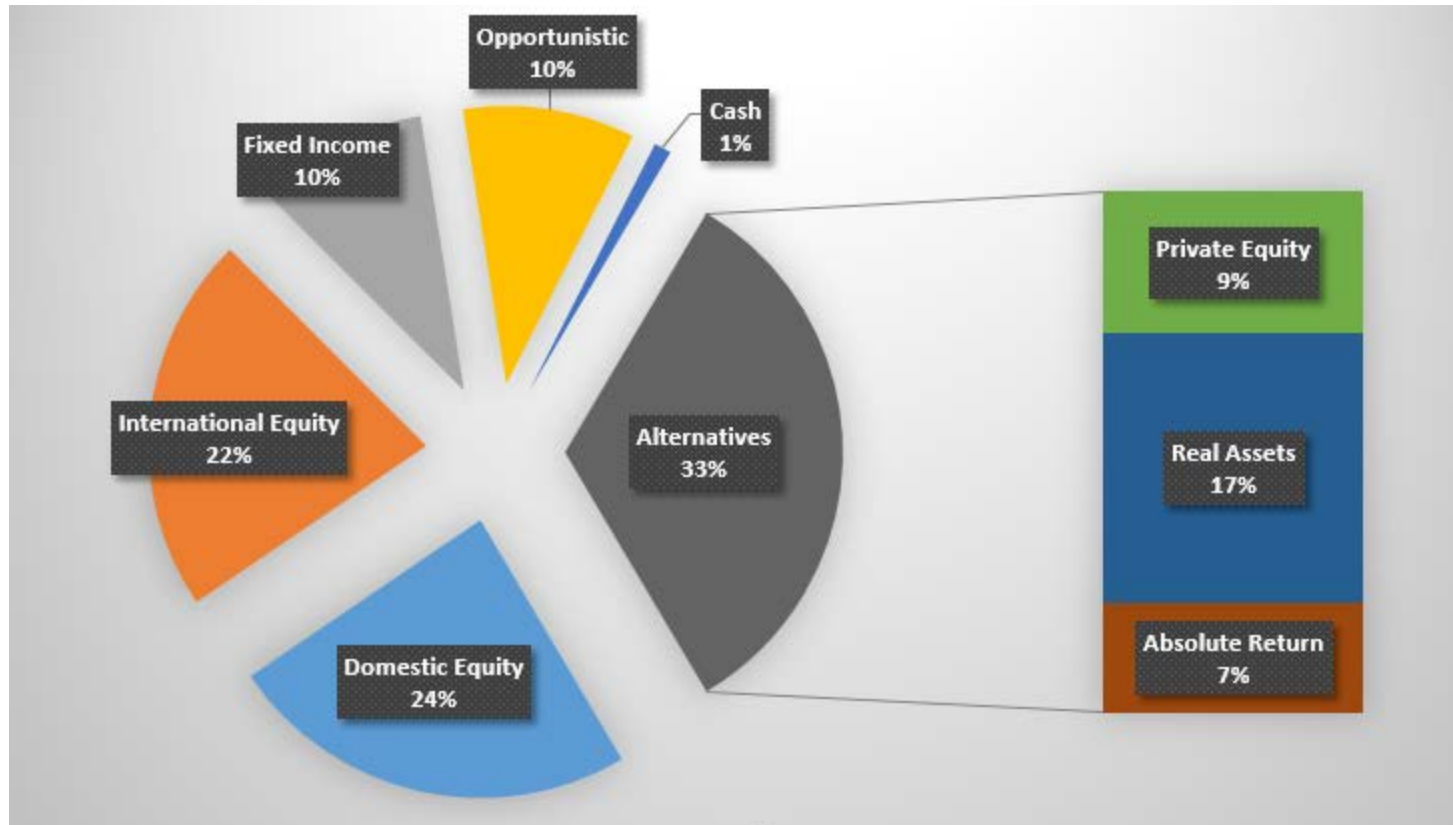
- Identify the **time horizon** over which the portfolio should be expected to achieve the required rate of return.
- Identify **asset classes** to be used.
- Identify **optimal allocation** to these asset classes that is expected to achieve the required rate of return. This is the Strategic Asset Allocation (SAA).
- Identify the **policy portfolio** – the portfolio comprised of passive publicly-traded equities and fixed income with the same risk profile as the SAA.

Strategic Asset Allocation – Time Horizon



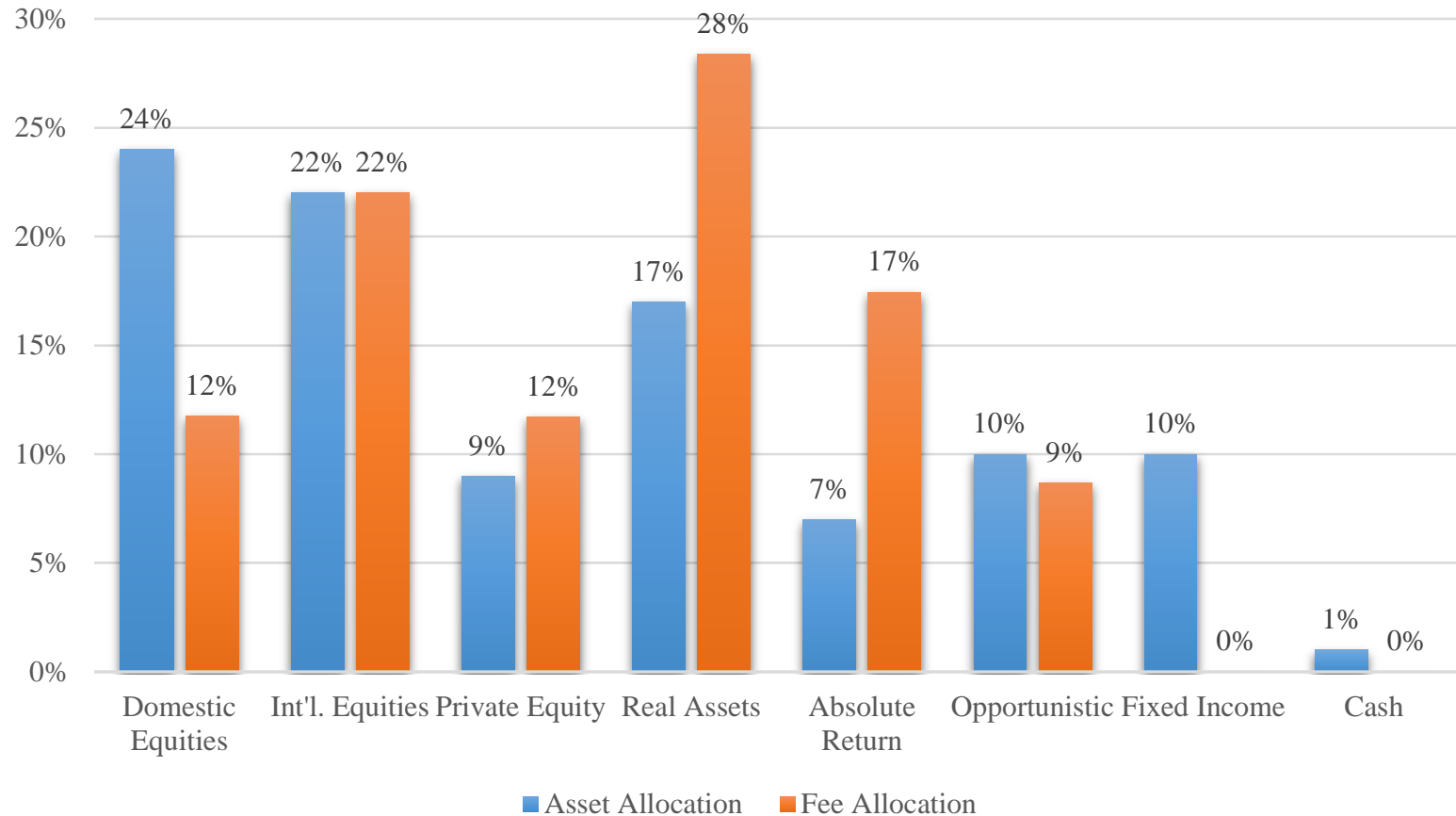
- A variety of considerations suggests the appropriate time horizon is longer than 10 years:
 - The plans, while closed, will be in existence for many decades.
 - Longer-dated capital market assumptions tend to change less. As a result, the strategic asset allocation is likely to be more consistent over time.
 - Duration of liabilities ~ 14 Years
 - Weighted average time to payment ~ 25 Years
- Staff recommends a 20-year horizon.

Strategic Asset Allocation – Identify Asset Classes

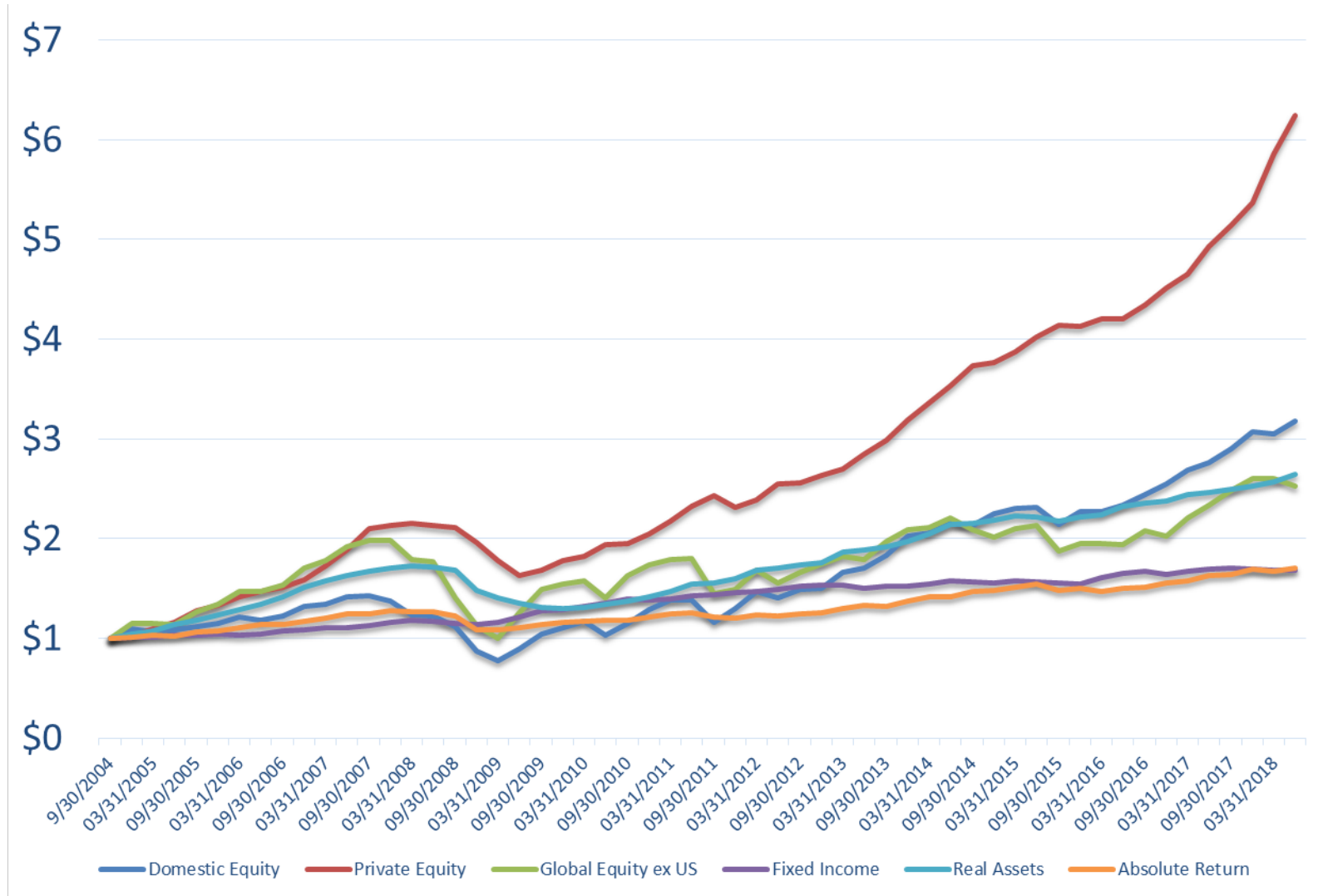


Absolute Return

Asset Allocation vs. Fee Allocation



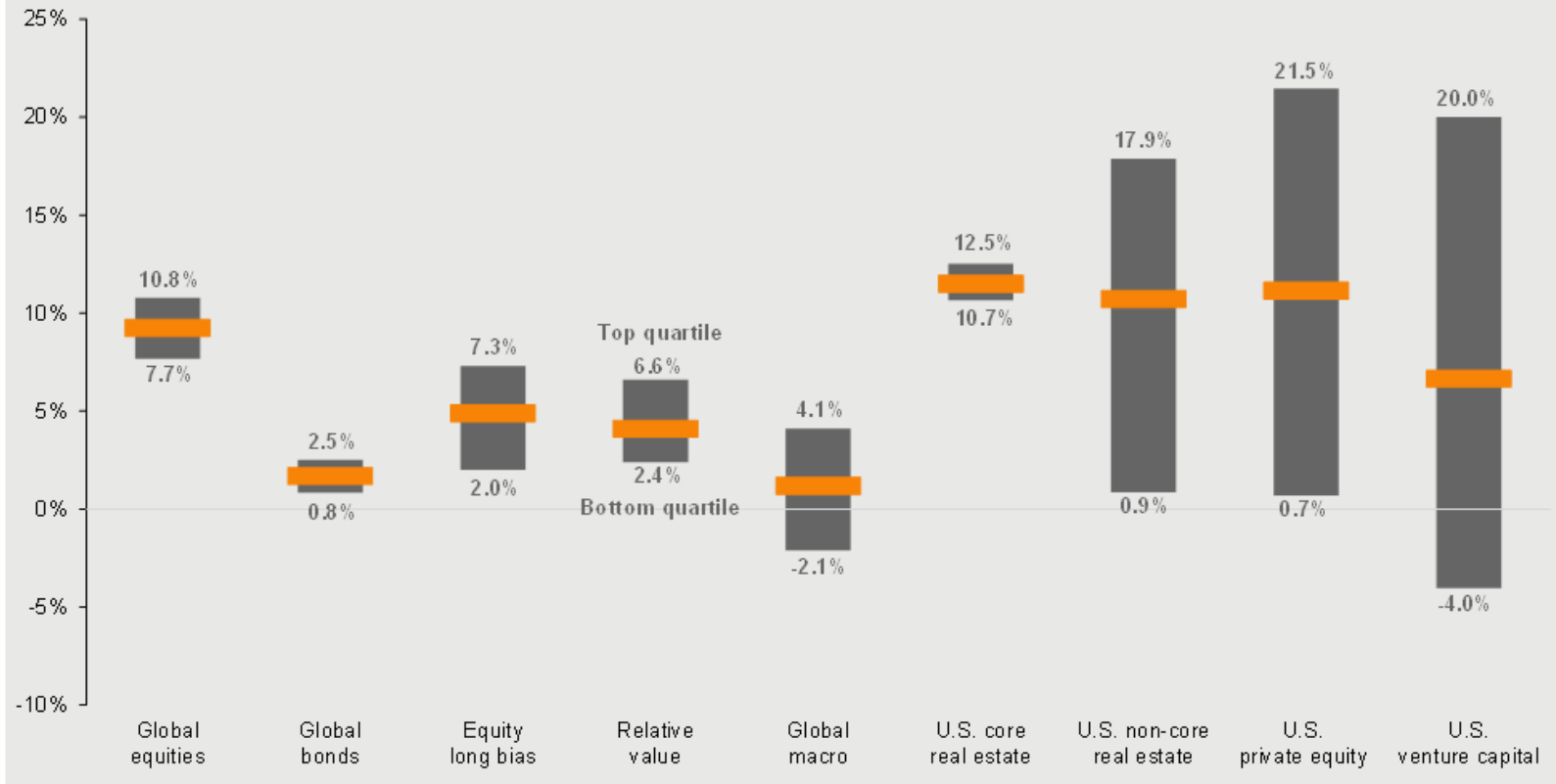
Asset Class Comparison – Growth of a \$



Manager Dispersion

Private and public manager dispersion

Based on returns from 2013 – 2018



Sources: Lipper, NCREIF, Cambridge Associates, HFRI, J.P. Morgan Asset Management.

Global equities (large cap) and global bonds dispersion are based on the world large stock and world bond categories, respectively. Manager dispersion is based on: 2013 – 2018 annual returns for global equities, global bonds, U.S. core real estate and hedge funds. U.S. non-core real estate, U.S. private equity and U.S. venture capital are represented by the 5-year horizon internal rate of return (IRR).

Data are as of December 31, 2018.

J.P.Morgan
Asset Management

Strategic Asset Allocation – Identify Asset Classes

- Exit Absolute Return.
 - Terminated one mandate in April.
 - Transfer mandates to Fixed Income and to Opportunistic.
 - Terminate three mandates.
- Collapse Cash into Fixed Income.
- Reorient Opportunistic.
 - Underlying benchmark remains the same.
 - Higher fixed income allocation allows for broadening risk profile.
Transfer some fixed income exposures from Opportunistic to Fixed Income.
 - Focus allocation in tactical asset allocation, and multi-asset class factor-based mandates, thematic mandates, risk parity, and strategies that do not fit well in other asset classes.
 - Terminate remaining mandates.

June 21, 2019



ARMB Asset Liability Study

Paul Erlendson
Fund Sponsor Consulting

Steve Center
Fund Sponsor Consulting

Jay Kloepper
Capital Markets Research

Callan

Asset-Liability Study Process Overview

Investment Policy Overview

Trustees' most important function is to develop a well-conceived investment policy

Investment policy is a combination of philosophy and long-range planning

- Philosophical Statements

- What is the purpose of the fund?
- How do we define success?
- How do we define risk?
- How much risk of failure should we assume?

- Long-range Planning

- Establishes the guidelines and procedures that direct the long-term management of the plans' assets
- Based on long-term estimates of capital market opportunities and the plans' obligations
- Allows decision-makers to observe a range of potential outcomes to prevent surprises and avoid panics

Investment policy succeeds not because of unique insights, but because of a focus on long-term goals and a continuity of applied strategies

- There is no one correct answer

- Different financial circumstances of sponsoring organizations
- Different sources and uses of the assets
- Different temperaments of decision-makers

Goal of the Asset-Liability Study

The goal of an asset-liability study is to establish a long-term strategic asset allocation target

An appropriate asset allocation will depend on the Plan Sponsor's investment objectives:

- Minimize costs over the long run (long-term goal)
 - How much return generation (from beta and alpha) is necessary to lower costs and/or improve funded status?
- Minimize funded status volatility (short-term goal)
 - How much risk reduction is necessary to reduce funded status volatility?

Investment solution is an optimal balance between sustainable funded status volatility and minimization of costs over the long run

- The trade-off is between minimizing cost in the expected case by taking on investment risk and the increase in the volatility of costs as a result
 - The reward is an improvement in the expected case, the risk is a worsening of the worst-case result

Asset allocation will vary by the unique circumstances of the Plan Sponsor

- No “one-size-fits-all” solution exists

Why Conduct an Asset and Liability Study?

The cornerstone of a prudent process for pension plan, endowment, and foundation trustees (and any individual investor) is a careful and thorough examination of their long-term strategic plan

Explicitly acknowledge change and uncertainty in the capital markets

Establish reasonable rate-of-return and risk expectations

Incorporate material changes in strategic policies

- Substantial changes in funding policy, benefit formula, eligibility, early retirement, COLA

Reflect changes in regulations

Project and evaluate impact on assets, liabilities and funded status

Confirm an investment policy to meet return and risk objectives in relation to funding, accounting and policy goals

If no material changes have occurred, an asset allocation review should still be conducted periodically

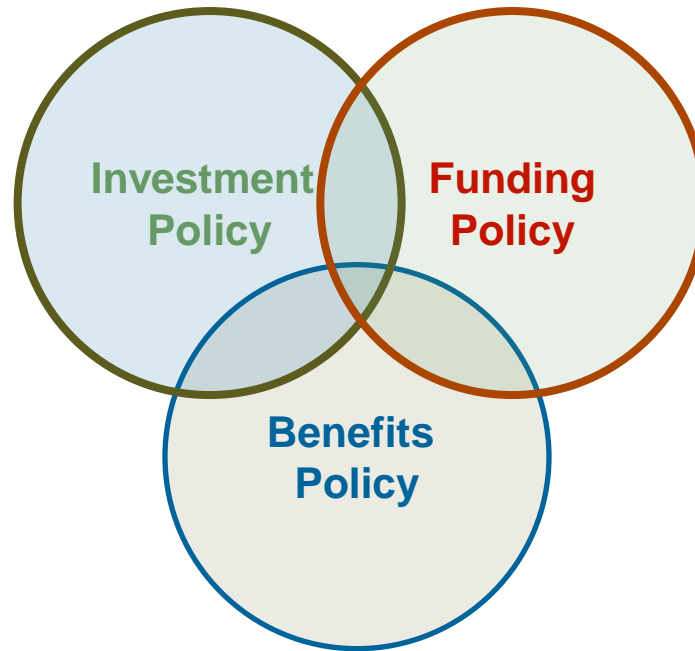
- Last study for PERS and TRS conducted in 2008

Interaction of Three Key Policies

Three strategic policies govern every pool of assets

Investment Policy

- How should the assets be invested?
- What are the risk and return objectives?
- How are the cash flows managed?
- What asset classes?



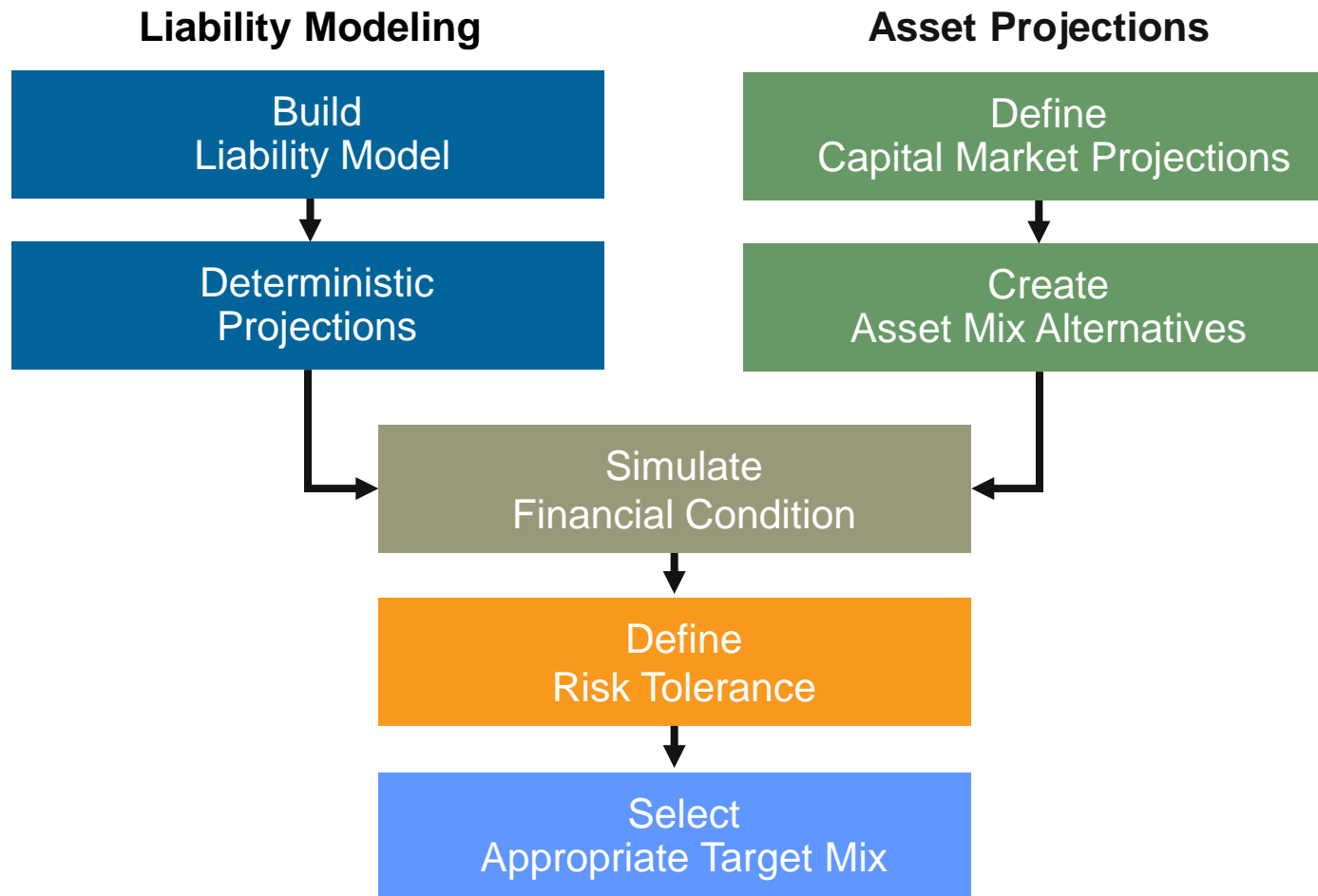
Funding Policy

- How will the benefits be paid for (funded)?
- How will deficits be paid for?
- How will costs be recognized?

Benefit Policy – Plan Design

- What types of benefits are offered?
- What are the dollar values of the benefits?
- When are the benefits paid?
- Open to new participants

Callan's Asset/Liability Study Process



Callan

Analysis of ARMB Liabilities

Construct Liability Model

Built detailed liability model for PERS and TRS, including the pension and medical liabilities for both

- Start with 2017 valuations and data set from Buck
- Constructed models to match 2017 valuation in ProVal, liability modeling system with capital market projection and simulation capabilities
 - Separate models for each of the liabilities (pension and medical) for each system
- Updated model to include results of 2018 valuation, which reflects assumption changes adopted by the Board following the experience study
- Generate 10-year projections based on actuarial assumptions
 - Include change to discount rate from 8.00% to 7.38%, and reduction in inflation assumption from 3.12% to 2.5%
 - Implies real return target of 4.88% (7.38% nominal return minus 2.5% inflation)
 - Reflects all plan changes adopted May 3, 2019
 - Modeled contribution policy as normal cost plus supplemental
- Evaluated each plan separately and rolled plans up into PERS, TRS and the two systems combined
- Conducted Monte Carlo simulation to generate range of potential results for key variables:
 - *Assets*
 - *Liabilities*
 - *Funded status*
 - *Contribution*
 - *Shortfall risk, impairment of the Plans' solvency*
- Completed risk/reward analysis and prepare study results for consideration

Projected Plan Membership

Plans are closed to new members

Systems have matured significantly with no new participants and the aging of the population within the plan. Total inactive population has increased substantially and dominates membership

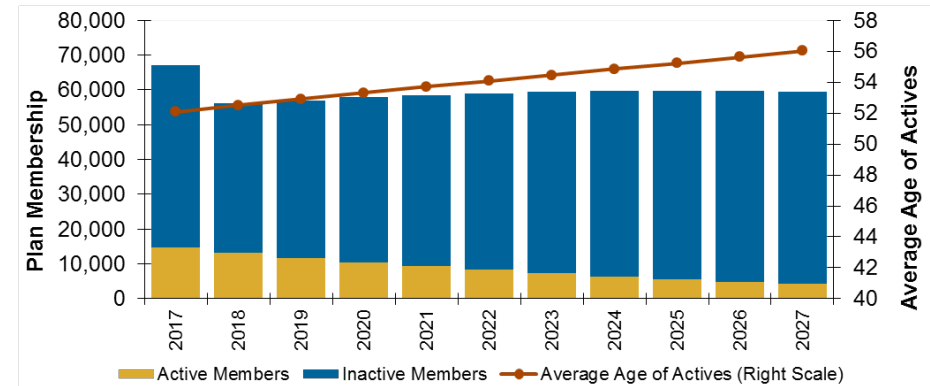
Remaining active population is mature

Inactive members include retirees and beneficiaries, disabled, and vested participants no longer working but not yet retired

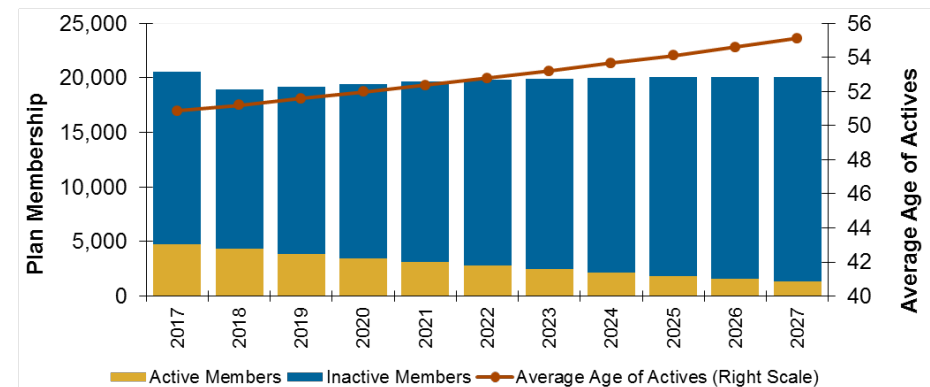
Membership count displayed is for the pension plans; the active member counts between pension and medical are similar, but the inactive counts differ

Inactive counts drop in 2018, as we removed a number of inactive members with very small accounts who will not be included in the liability projections

PERS



TRS



Projected Liabilities

Sum of Pension and Medical

Active liability as a percentage of total liability falls for both plans over the next 10 years

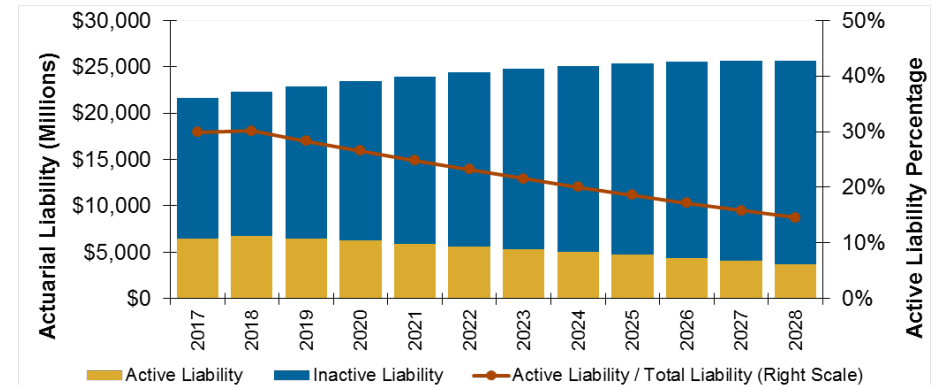
PERS: 30% to 15%

TRS: 27% to 12%

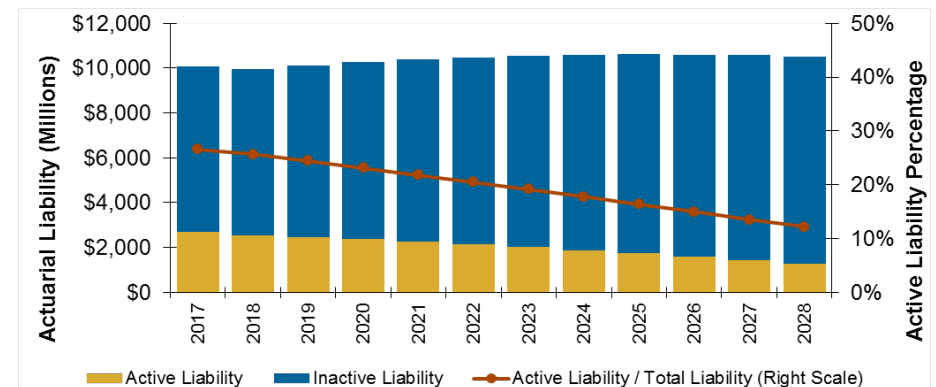
“Active liability” refers to plan participants still working and accruing additional benefits

“Inactive liability” refers to participants no longer working or accruing benefits, and either retired and receiving payments or waiting to retire and commence receipt of benefit payments

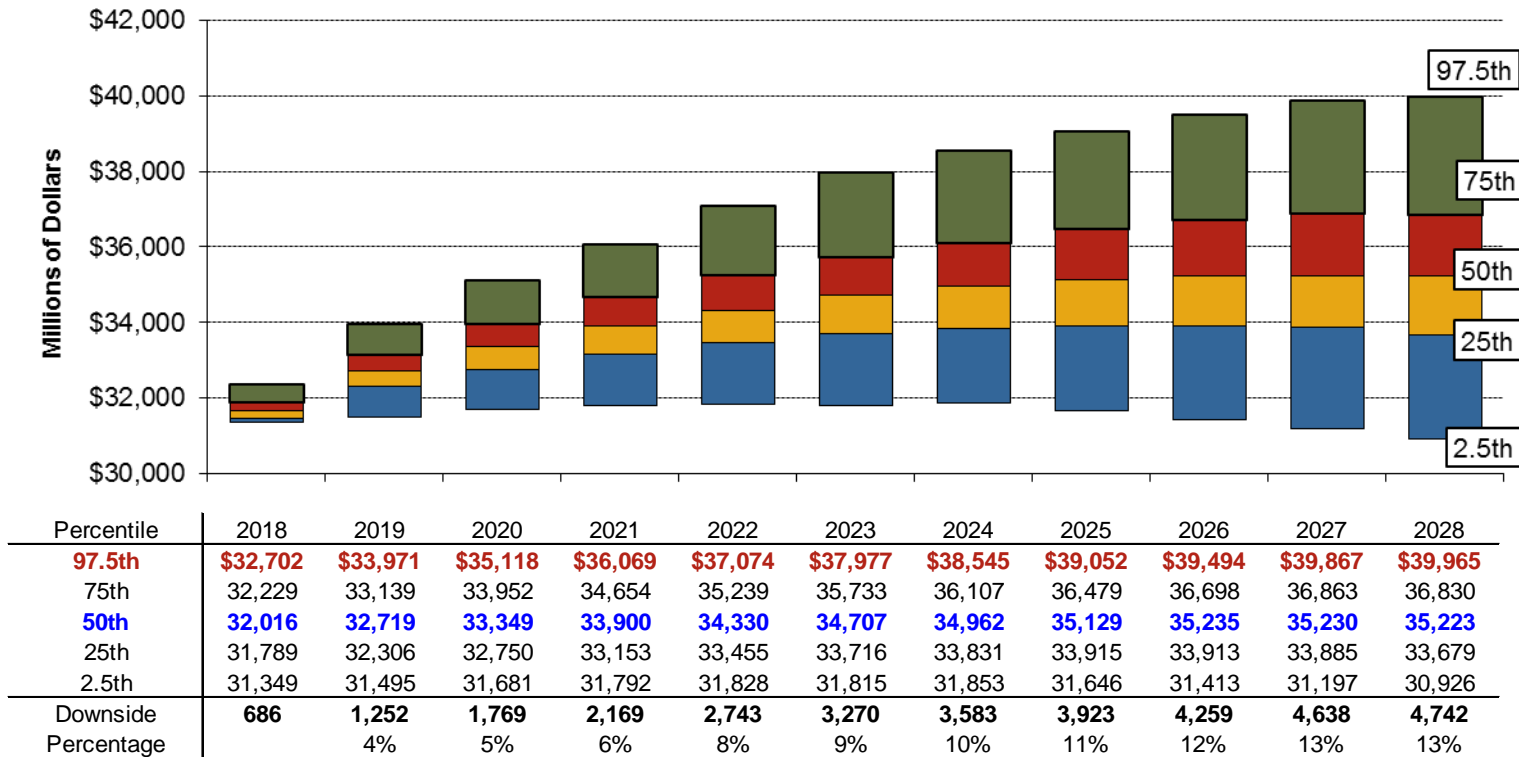
PERS



TRS



Simulated Actuarial Liability Projection – Combined Plans



- Liabilities increase with interest cost (7.38%) and normal cost; they are reduced by benefit payments
- Median liability growth (net of benefit payments) slows after five years and turns flat by ten years
 - Flat to declining liability growth is expected for a mature plan; the growth comes from PERS, both pension and medical; TRS liabilities are flat over the 10-year period
 - Liability projections were reduced meaningfully after the changes adopted in 2019
- Volatility stems from inflation uncertainty as the Plans' liabilities are sensitive to "unexpected" inflation and the resulting impact on salaries, healthcare costs, and postretirement pension adjustments

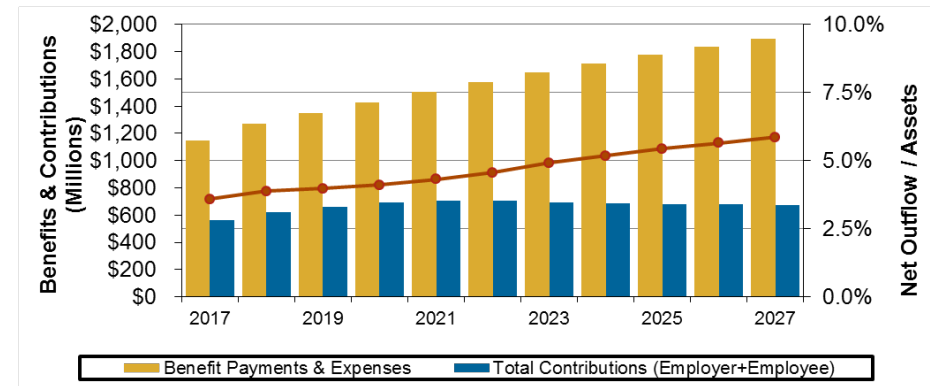
Cash Flow Projection – Plan Liquidity Needs

Sum of Pension and Medical

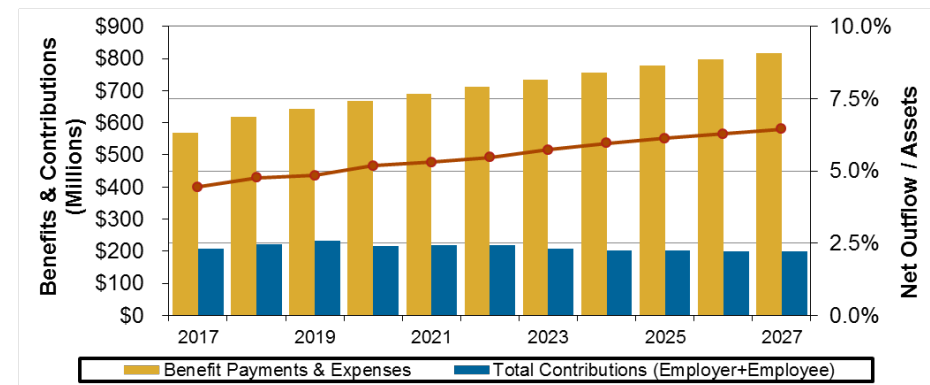
Net cash flow = benefit payments – contributions

- Liquidity needs help define the appropriate time horizon for the Plans' investments and shape the ability of the Plans to commit to illiquid asset classes
- Net outflow as a percentage of plan assets provides scale
 - Liquidity needs below 5% are considered manageable and do not typically hinder asset allocation policy
 - Needs that approach 10% can impair a plan's solvency and may impact asset allocation, both the amount of risk and the exposure to illiquid asset classes
- Both plans are approaching 5% and will see liquidity needs rise gradually over the next 10 years
 - Liquidity needs are greater for TRS rising from below 5% to 6.6%
 - Liquidity needs must be met by selling assets; 10% allocation to fixed income and 1% to cash will not generate enough yield to cover net outflows
- Net outflow is supported by projections of substantial contributions over the forecast horizon
 - Modeled funding policy as normal cost plus amortization of unfunded liability

PERS



TRS



Projected Funded Status

Sum of Pension and Medical

Asset growth - net of cash flows - is projected for both plans over the next 10 years

- Liability growth is expected to slow and fall behind asset growth

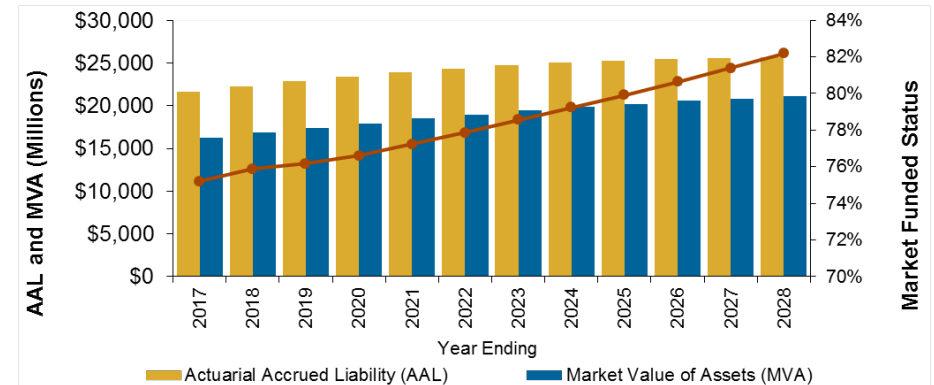
Projection assumes 7.38% nominal return and 2.5% inflation going forward

- Lower inflation feeds through to lower liability growth

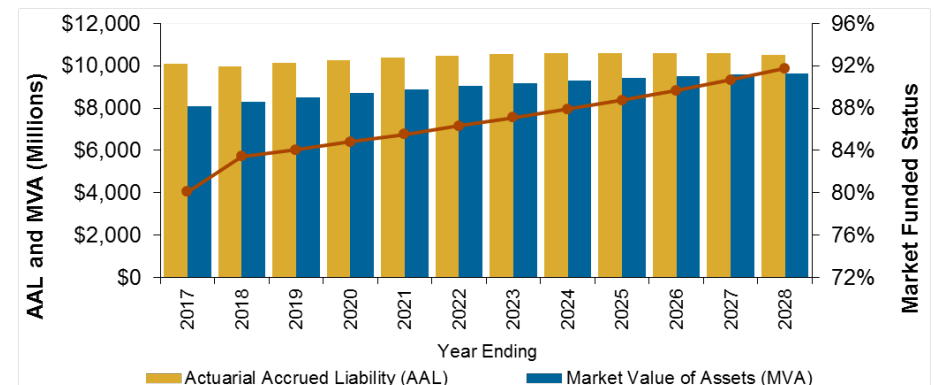
Funded status reflects the combined status of the two plans within each system

- Medical plans for both systems are close to fully funded
- PERS pension plan is 65% funded, TRS is 76%
- Uptick in funded status in 2018 comes from changes in assumptions for valuation adopted by the Board
- Progress on funded status assumes plans pursue current funding policy, particularly for pensions

PERS



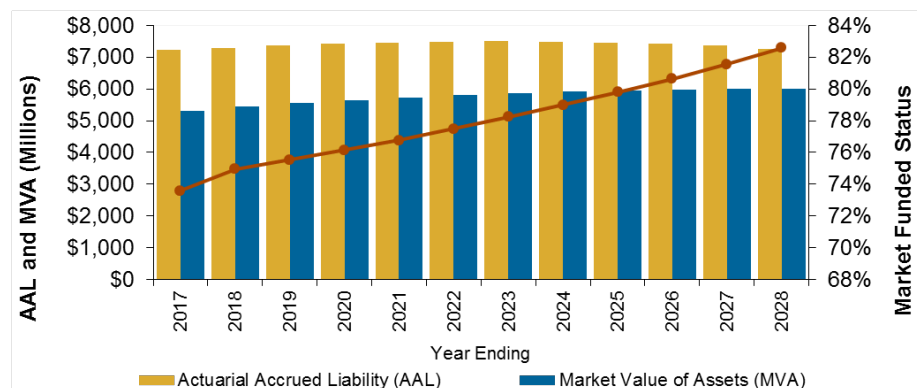
TRS



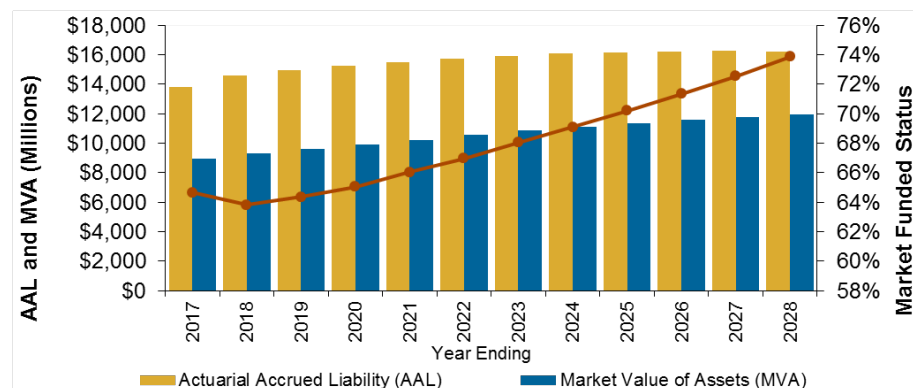
Projected Funded Status

Pension vs Medical

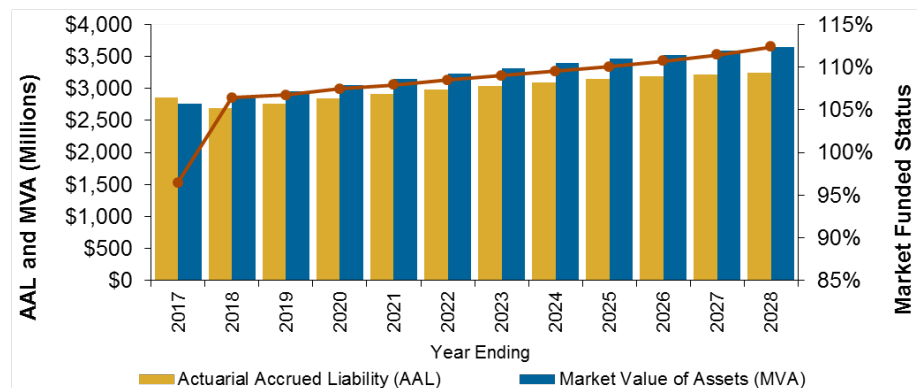
TRS Pension



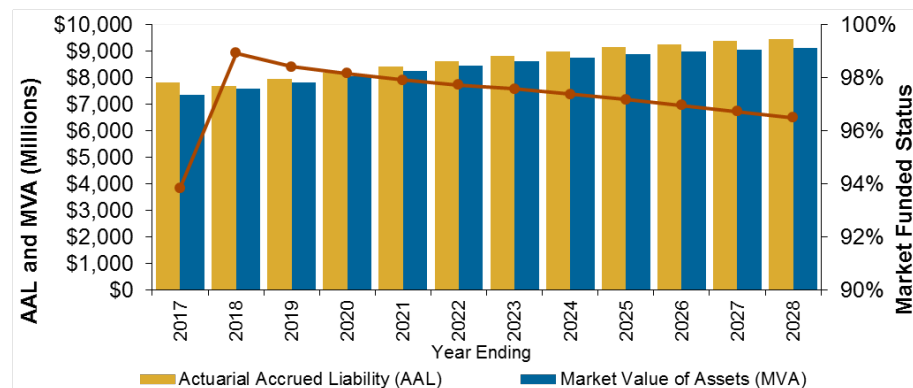
PERS Pension



TRS Medical



PERS Medical



Liability Duration and Future Benefit Payments - PERS

Potential Indicators of Longer Time Horizon for Both Plans

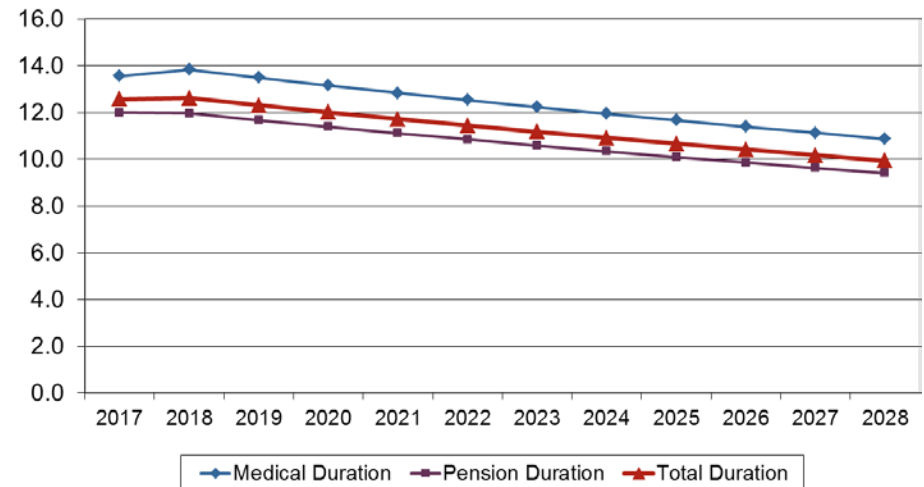
Duration measures the timing of future cash flows.
Future cash flows extend for the life of beneficiaries.

- Duration also measures the sensitivity of the liabilities to changes in the discount rate
 - A duration of 12 suggests that for a 1% drop in yields, total liabilities will increase by roughly 12%
 - Medical duration is longer than pension duration

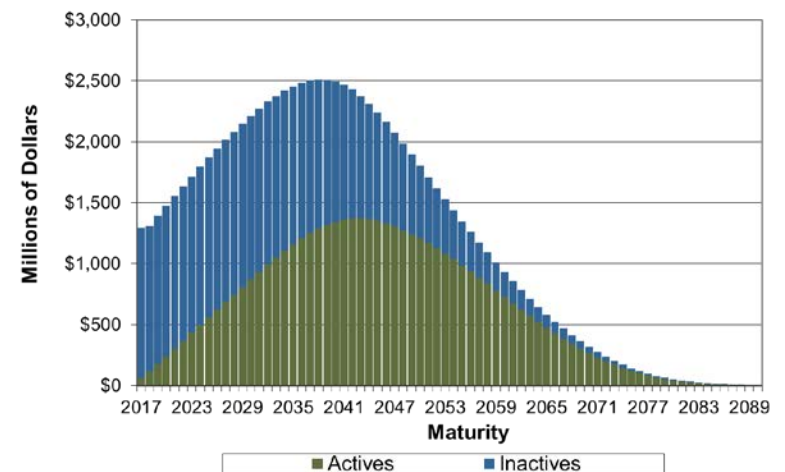
Cash flows for PERS may extend far out into the future

These charts indicate that the investment time horizon for PERS remains long, despite the relative maturity of the plan

Duration - PERS



PV of Future Benefit Payments - PERS



Liability Duration and Future Benefit Payments - TRS

Potential Indicators of Longer Time Horizon for Both Plans

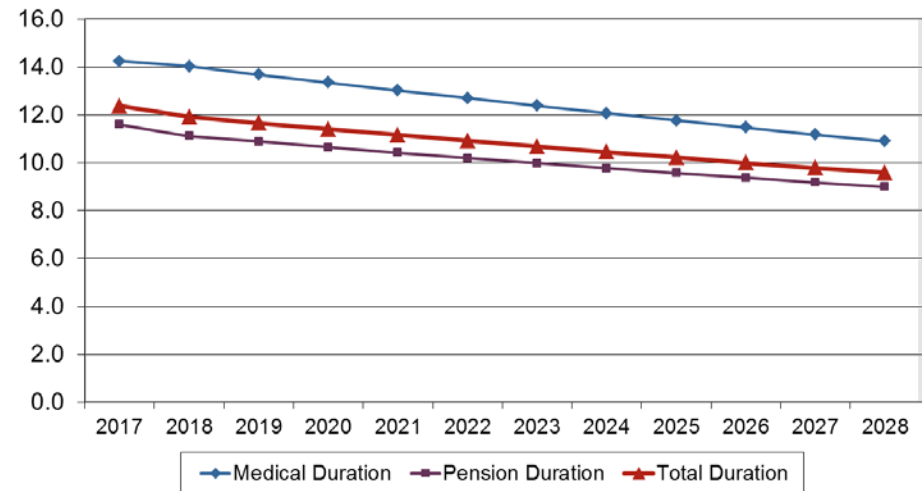
Duration measures the timing of future cash flows.
Future cash flows extend for the life of beneficiaries.

- Duration also measures the sensitivity of the liabilities to changes in the discount rate
 - A duration of 12 suggests that for a 1% drop in yields, total liabilities will increase by roughly 12%
 - The spread between medical duration and pension duration is wider for TRS

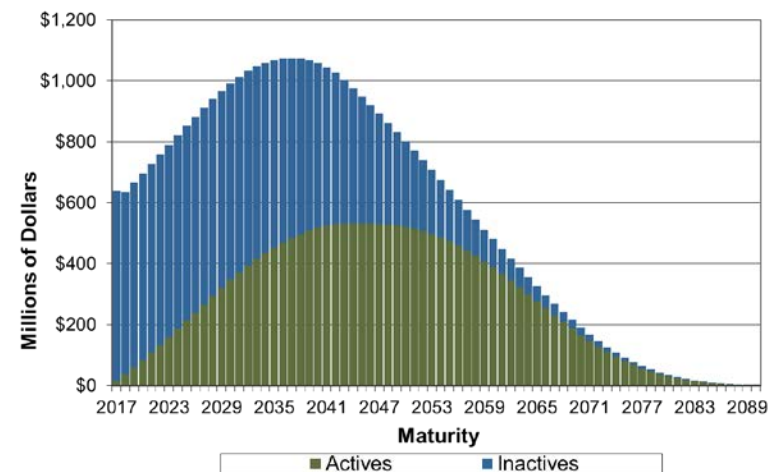
Cash flows for TRS may extend far out into the future

These charts indicate that the investment time horizon for TRS remains long, despite the relative maturity of the plan

Duration - TRS



PV of Future Benefit Payments - TRS



Liability Risks Inform Asset Allocation – the Point of an A-L Study

- Preliminary evaluation of the projected liabilities suggests very mature plans, dominated by inactive members and their liabilities
 - Despite this maturity, the investment time horizon for both plans is still long, with total plan duration north of 12 years and cash flows extending out decades
 - Balance to be struck is how much risk to take in mature plans with very long “glidepaths” to the distribution of benefits
- Liability risks include:
 1. **Inflation risk** is the most prevalent capital market risk within the liabilities
 - *Unexpected inflation – already incorporate expected inflation. Impacts wage inflation and pension adjustments linked to COLA*
 - *No perfectly correlated asset class, but inflation-sensitive assets can help*
 - *Over the long term, equity is a claim on the underlying economy and a reasonable inflation hedge*
 2. **Healthcare cost risk**
 - *Already incorporate trend healthcare costs and aging; risk is unexpected healthcare inflation*
 - *No effective hedge to healthcare costs, which have historically run higher than broad inflation*
 - *Target higher return, equity exposure over the long term*
 3. **Longevity risk**
 - *No investment hedge, periodic adjustment via contributions and regular experience studies informing annual valuation process*
 4. **Limited interest rate risk within the liabilities**; the discount rate implies the targeted investment return
 - *Discount rate is not marked-to-market, so Plans are not exposed to annual risk, just episodic adjustment (recent change to 7.38%)*
 - *Liabilities expected to grow at 7.38% plus experience gains and losses*
- Capital markets themselves pose the biggest risk to the plans: downdraft, volatility, underperforming expectations

Callan

**Capital Market Projections
Asset Modeling**

2019 Callan Capital Market Projections

Risk and return: 2019–2028

		PROJECTED RETURN			PROJECTED RISK		2018 - 2027	
Asset Class	Index	1-Year Arithmetic	10-Year Geometric*	Real	Standard Deviation	Projected Yield	10-Year Geometric*	Standard Deviation
Equities								
Broad U.S. Equity	Russell 3000	8.50%	7.15%	4.90%	17.95%	2.00%	6.85%	18.25%
Large Cap	S&P 500	8.25%	7.00%	4.75%	17.10%	2.10%	6.75%	17.40%
Small/Mid Cap	Russell 2500	9.55%	7.25%	5.00%	22.65%	1.55%	7.00%	22.60%
Global ex-U.S. Equity	MSCI ACWI ex USA	9.20%	7.25%	5.00%	21.10%	3.10%	7.00%	21.00%
Non-U.S. Equity	MSCI World ex USA	8.70%	7.00%	4.75%	19.75%	3.25%	6.75%	19.70%
Emerging Markets Equity	MSCI Emerging Markets	10.70%	7.25%	5.00%	27.45%	2.65%	7.00%	27.45%
Fixed Income								
Short Duration	Bloomberg Barclays 1-3 Yr G/C	3.40%	3.40%	1.15%	2.10%	3.25%	2.60%	2.10%
U.S. Fixed	Bloomberg Barclays Aggregate	3.75%	3.75%	1.50%	3.75%	3.85%	3.00%	3.75%
Long Duration	Bloomberg Barclays Long G/C	4.25%	3.75%	1.50%	10.65%	4.80%	3.00%	10.95%
TIPS	Bloomberg Barclays TIPS	3.80%	3.75%	1.50%	5.05%	3.90%	3.00%	5.25%
High Yield	Bloomberg Barclays High Yield	5.75%	5.35%	3.10%	10.35%	7.75%	4.75%	10.35%
Non-U.S. Fixed	Bloomberg Barclays Gbl Agg ex US	1.80%	1.40%	-0.85%	9.20%	2.35%	1.40%	9.20%
Emerging Market Debt	EMBI Global Diversified	5.40%	5.05%	2.80%	9.50%	6.00%	4.50%	9.60%
Other								
Real Estate	NFI-ODCE	7.30%	6.25%	4.00%	15.70%	4.75%	5.75%	16.35%
Private Equity	Cambridge Private Equity	12.40%	8.50%	6.25%	29.30%	0.00%	7.35%	32.90%
Hedge Funds	Callan Hedge FOF Database	5.75%	5.50%	3.25%	8.85%	2.50%	5.05%	9.15%
Commodities	Bloomberg Commodity	4.75%	3.20%	0.95%	18.00%	2.50%	2.65%	18.30%
Cash Equivalents	90-Day T-Bill	2.50%	2.50%	0.25%	0.90%	2.50%	2.25%	0.90%
Inflation	CPI-U		2.25%		1.50%		2.25%	1.50%

Note that return projections for public markets assume index returns with no premium for active management.

* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Source: Callan

2019 Callan Capital Market Projections

Correlation: 2019–2028

Broad U.S. Eq	1.00																			
Large Cap	1.00	1.00																		
Small/Mid Cap	0.96	0.93	1.00																	
Global ex-U.S. Eq	0.85	0.84	0.84	1.00																
Non-U.S. Eq	0.81	0.80	0.80	0.99	1.00															
Em Market Eq	0.87	0.86	0.86	0.94	0.88	1.00														
Short Duration	-0.23	-0.22	-0.26	-0.25	-0.23	-0.28	1.00													
U.S. Fixed	-0.11	-0.10	-0.15	-0.14	-0.12	-0.17	0.88	1.00												
Long Duration	0.11	0.11	0.10	0.08	0.09	0.04	0.74	0.93	1.00											
TIPS	-0.05	-0.04	-0.08	-0.06	-0.05	-0.09	0.56	0.64	0.53	1.00										
High Yield	0.64	0.63	0.62	0.63	0.61	0.62	-0.13	0.02	0.19	0.06	1.00									
Non-U.S. Fixed	0.01	0.01	0.00	0.07	0.05	0.10	0.48	0.53	0.54	0.40	0.12	1.00								
Em Market Debt	0.57	0.57	0.55	0.57	0.54	0.58	-0.04	0.10	0.20	0.18	0.60	0.01	1.00							
Real Estate	0.74	0.73	0.72	0.71	0.68	0.70	-0.13	-0.04	0.17	0.00	0.56	-0.05	0.47	1.00						
Private Equity	0.92	0.92	0.88	0.88	0.86	0.86	-0.30	-0.23	-0.01	-0.14	0.55	0.06	0.45	0.66	1.00					
Hedge Funds	0.76	0.76	0.74	0.74	0.72	0.73	-0.08	0.09	0.29	0.09	0.57	-0.05	0.54	0.64	0.62	1.00				
Commodities	0.15	0.15	0.15	0.16	0.16	0.16	-0.22	-0.10	-0.04	0.12	0.10	0.15	0.19	0.20	0.18	0.21	1.00			
Cash Equivalent	-0.04	-0.03	-0.08	-0.04	-0.01	-0.10	0.30	0.10	-0.04	0.12	-0.11	0.00	-0.07	-0.06	0.00	-0.07	0.07	1.00		
Inflation	-0.01	-0.02	0.02	0.01	0.00	0.03	-0.20	-0.28	-0.29	0.10	0.07	-0.10	0.00	0.10	0.06	0.20	0.40	0.00	1.00	
	Broad U.S. Eq	Large Cap	Small/Mid Cap	Global ex-U.S. Eq	Non-U.S. Eq	Em Market Eq	Short Duration	U.S. Fixed	Long Duration	TIPS	High Yield	Non-U.S. Fixed	Em Market Debt	Real Estate	Private Equity	Hedge Funds	Comm	Cash Equiv	Inflation	

- Relationships between asset classes are as important as standard deviation
- To determine portfolio mixes, Callan employs mean-variance optimization
- Return, standard deviation and correlation determine the composition of efficient asset mixes

Source: Callan

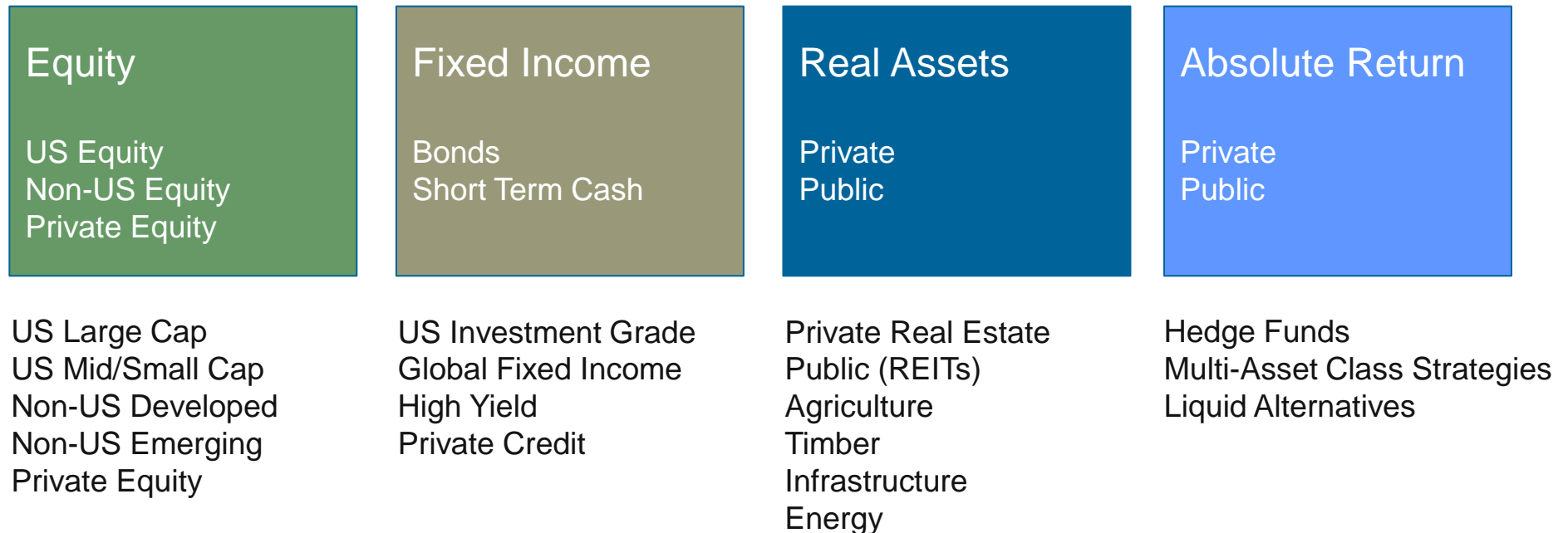
Investment Policy Process

Broad Definitions are Most Appropriate for Asset Allocation Policy Analysis

Investment policy study is focused on capital market risk and return

- Asset allocation policy is based on acceptable asset classes and acceptable level of investment uncertainty

An asset class is a group of securities or investment strategies that have similar financial characteristics; behave similarly in response to market conditions; and behave differently from the securities (or strategies) contained in other asset classes



Customized ARMB Capital Market Projections

ARMB Asset Allocation Model 2019-2028

Asset Class	Target Weight	PROJECTED RETURN			PROJECTED RISK	
		1-Year Arithmetic	10-Year Geometric Return		Annualized Standard Deviation	Projected Yield
Public Equities	46.0%					
Broad US Equity	24.0%	8.50%	7.15%		18.00%	2.00%
Global Ex-US Equity	22.0%	9.20%	7.25%		21.10%	3.10%
Fixed Income	10.0%					
Intermediate Treasuries	10.0%	3.40%	3.40%		2.90%	3.30%
Opportunistic	10.0%					
Opportunistic	10.0%	6.45%	6.10%		10.20%	2.80%
Private Equity	9.0%					
Private Equity	9.0%	12.40%	8.50%		29.30%	0.00%
Real Assets	17.0%	7.60%	6.75%		14.25%	4.70%
Real Estate	6.0%	7.30%	6.25%		15.70%	4.75%
Timber	1.7%	7.10%	6.20%		14.55%	3.90%
Farmland	4.3%	7.20%	6.25%		15.00%	4.50%
Private Infrastructure	3.0%	8.15%	6.75%		18.00%	5.00%
MLPs	2.1%	8.70%	6.80%		20.70%	5.00%
Absolute Return	7.0%					
Hedge Funds	7.0%	5.75%	5.50%		8.85%	2.25%
Cash Equivalents	1.0%					
Cash Equivalents	1.0%	2.50%	2.50%		0.90%	2.50%
Inflation			2.25%		1.50%	
Total Fund	100.0%	7.88%	7.00%		14.80%	2.75%

Projection set customized to reflect specific ARMB strategies:

- Real assets, opportunistic and intermediate Treasuries (instead of broad market fixed income)

Current target projected to generate a return of 7% compounded over 10 years, at a risk (standard deviation) of 14.8%

Portfolio Considerations for the Asset-Liability Study

Fundamental Setting of the Tolerance for Risk

Current ARMB implementation for PERS and TRS is the same, across both pension and medical benefits.

Current portfolio has 10% allocated to fixed income, another 4% implied in the opportunistic bucket (plus 1% in cash), which is low relative to peers and relative to diversified portfolios over history

- 85% of the portfolio is in growth-oriented assets, although not all strategies are equity risk
- 85/15 exposes the PERS and TRS Plans to substantial capital growth potential, at the expense of substantial volatility and the potential for sharp drawdowns in adverse markets
- Current target has a relatively large (17%) exposure to real assets, anchored by 6% in private real estate, with benchmark exposures to timber, farmland, infrastructure and MLPs
 - The Plans have an elevated sensitivity to inflation, and the large real asset component has been in place for a long time
- Target includes 7% to hedge funds and 9% to private equity
 - Total alternatives target is 33% of fund assets

Public funds have been “cornered” by low shorter-term capital market expectations in the face of unchanging need for asset growth to fund benefits

- Unintended consequence has been a relentless risking-up of portfolios in search of return
 - Accompanied by extensive diversification into uncorrelated sources of return in less liquid, less frequently valued, private market investments
- As a result, many public funds have developed portfolios that may not be well positioned in a sharp market downturn, and may face liquidity challenges even in normal markets, but particularly in a crisis when liquidity needs remain (benefit payments, rebalancing)

How long should the time horizon be for strategic planning and setting asset allocation policy?

Expanding the Length of the Forecast Horizon

10-Year vs. Equilibrium Capital Market Expectations

- As the time horizon grows beyond 10 years, our capital market expectations increasingly incorporate “equilibrium returns”. Equilibrium returns reference **long-term historical mean results**, with an overlay of informed judgment. Key elements to consider:
 - Nominal returns
 - Inflation
 - Real returns
 - Risk premium – bonds over cash, stocks over bonds, long duration over short
 - Long-term underlying economic growth (real GDP)
- 10-Year expectations:
 - Large Cap Stocks: 7.0% nominal, 4.75% real, 3.25% premium over bonds
 - Bonds: 3.75% nominal, 1.50% real, 1.25% premium over cash
 - Cash: 2.50% nominal, 0.25% real
 - Inflation: 2.25%
 - Underlying economic growth (real GDP) – 2 to 2.5% per year
- Equilibrium expectations:
 - Large Cap Stocks: 8.25% nominal, 6.0% real, 3.25% premium over bonds
 - Bonds: 5% nominal, 2.75% real, 1.75% premium over cash
 - Cash: 3.25% nominal, 1.0% real
 - Inflation: 2.25%
 - Underlying economic growth (real GDP) – 3% per year

As Time Horizon Increases, Expected Returns Increase

Transition from 10-Year to 20-Year Horizon – Heading Toward LT Equilibrium

AssetClass	2019-2028 10-Year Annualized Return	2019-2038 20-Year Annualized Return	2019-2043 25-Year Annualized Return	2019-2048 30-Year Annualized Return	Long-Term Annualized Equilibrium Return	Projected Standard Deviation
Broad US Equity	7.15%	7.30%	7.50%	7.70%	8.45%	17.97%
Large Cap	7.00%	7.15%	7.35%	7.50%	8.25%	17.10%
Small/Mid Cap	7.25%	7.60%	7.85%	8.10%	9.05%	22.65%
Global ex US Equity	7.25%	7.50%	7.70%	7.95%	8.75%	21.08%
International Equity	7.00%	7.10%	7.30%	7.50%	8.25%	19.75%
Emerging Markets Equity	7.25%	7.90%	8.15%	8.40%	9.50%	27.45%
Intermediate Treasuries	3.40%	3.40%	3.45%	3.50%	4.00%	2.90%
Domestic Fixed	3.75%	3.75%	3.85%	4.00%	5.00%	3.75%
Opportunistic	6.10%	6.15%	6.30%	6.45%	7.30%	10.22%
Real Estate	6.25%	6.25%	6.40%	6.50%	7.00%	15.70%
Timber	6.20%	6.55%	6.65%	6.75%	7.20%	14.55%
Farmland	6.25%	6.55%	6.65%	6.85%	7.30%	15.00%
Infrastructure, private	6.75%	6.75%	6.85%	7.00%	7.40%	18.00%
MLP	6.80%	7.00%	7.25%	7.50%	8.00%	20.70%
Real Assets	6.75%	6.90%	7.05%	7.20%	7.65%	14.25%
Hedge Funds	5.50%	5.50%	5.50%	5.50%	6.10%	8.85%
Private Equity	8.50%	9.30%	9.40%	9.50%	10.00%	29.30%
Cash Equivalents	2.50%	2.50%	2.65%	2.85%	3.25%	0.90%
Inflation	2.25%	2.25%	2.25%	2.25%	2.25%	1.50%

Diversified Portfolios Including Alternative Asset Classes

Achieve 4.88% Real Return over 10-, 20-, 25- and 30-Year Horizons

- Portfolios optimized using broad US and non-US equity, broad US fixed income, as well as real assets and private equity
- Absolute Return and Opportunistic not included in the alternative portfolios for modeling
 - Opportunistic is benchmarked 60/40 to public market stocks and bonds
 - Absolute Return/Hedge Fund program is expected to be discontinued
- Private equity limited to no more than 25% of the sum of total public equity
- Real assets modeled using current target weights to each component within the total real asset composite
- Less exposure to equity is required to meet the 7.13 return target over longer time horizons, with higher expected return

Asset Classes	10 Years	20 Years	25 Years	30 Years
Broad Domestic Equity	33.5%	30.3%	28.3%	26.4%
Global ex US Equity	21.8%	19.8%	18.6%	17.3%
Fixed Income	21.1%	28.4%	32.9%	37.2%
Real Assets	8.8%	8.0%	7.5%	7.1%
Private Equity	13.8%	12.5%	11.7%	11.0%
Cash Equivalents	1.0%	1.0%	1.0%	1.0%
Totals	100%	100%	100%	100%

10-Year Projection	Uncompounded Return (Arithmetic)	8.05%
	10-Year Compounded Return	7.13%
	10-Year Real Return	4.88%
	Standard Deviation	15.16%

20-Year Projection	Uncompounded Return (Arithmetic)	7.84%
	20-Year Compounded Return	7.13%
	20-Year Real Return	4.88%
	Standard Deviation	13.70%

25-Year Projection	Uncompounded Return (Arithmetic)	7.73%
	25-Year Compounded Return	7.13%
	25-Year Real Return	4.88%
	Standard Deviation	12.82%

30-Year Projection	Uncompounded Return (Arithmetic)	7.64%
	30-Year Compounded Return	7.13%
	30-Year Real Return	4.88%
	Standard Deviation	11.97%

Focus on 20-Year Time Horizon for Portfolio Design

Compare Return and Risk for Diversified and Public Markets-Only Portfolios

- Duration, cash flows and demographic forecasts suggest the investment time horizon for PERS and TRS remains long
- Current 10-year capital market forecasts can lead investors to take on substantial risk to meet a fixed return goal
- Extending the forecast horizon may enable the Plans to moderate exposure to risk assets while still meeting the return target over this longer horizon
- Use a 20-year horizon to develop a potential asset mix target that meets the real return goal but allows alternative risk posture for the Plans
- Use the asset mixes developed on previous slide to articulate a range of potential alternatives to evaluate
 - Mix 4 corresponds to 10 years, Mix 1 corresponds to 30 years
- Mix 3 shown at right is expected to generate a long-term (20-year) return that meets the plan's real return target
- Monte Carlo simulation is still conducted over a 10-year planning horizon

Asset Classes	Public Markets	Mix 3
Broad Domestic Equity	45.1%	30.3%
Global ex US Equity	29.5%	19.8%
Fixed Income	25.4%	28.4%
Real Assets	0.0%	8.0%
Private Equity	0.0%	12.5%
Cash Equivalents	0.0%	1.0%
Totals	100%	100%

20-Year Projection	Uncompounded Return (Arithmetic)	7.64%	7.84%
	20-Year Compounded Return	6.91%	7.13%
	20-Year Real Return	4.66%	4.88%
	Standard Deviation	13.70%	13.70%

Portfolios to Consider – 20 Year Time Horizon

10- and 20-year Projections

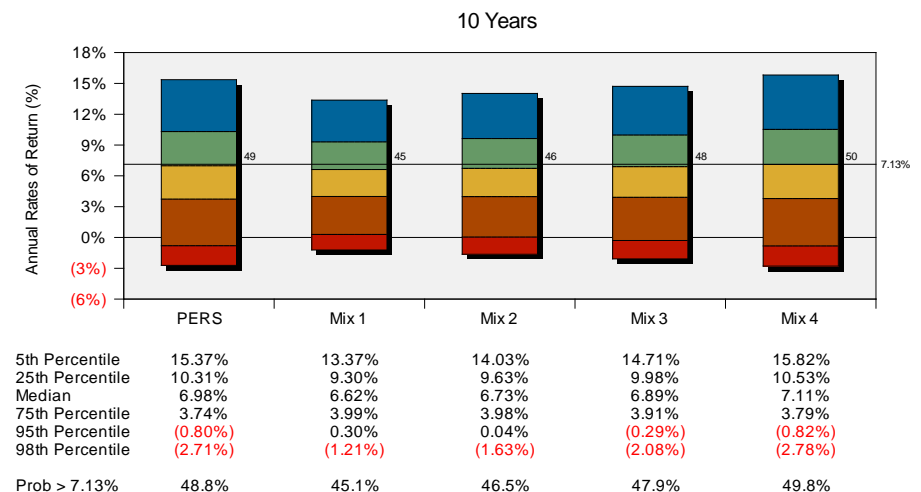
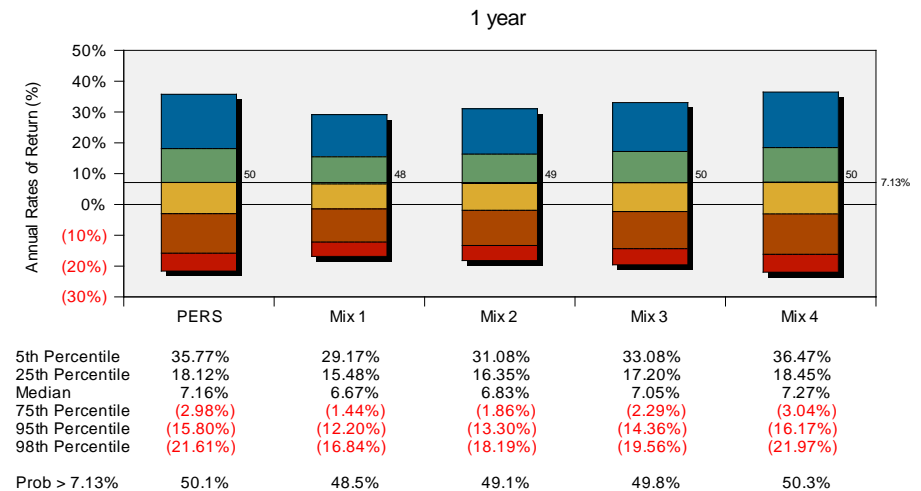
- Purpose of asset-liability study is to set the broad tolerance for investment risk
- ARMB could consider a less risky posture for the fund, balancing the need for return with the maturity of Plans' liabilities and the size of the potential drawdown an 85/15 exposure (current target) represents.
- Plans modeled with intermediate Treasuries as fixed income; alternative mixes use the Aggregate
- The alternative portfolios correspond to the mixes that generate the target return across different time horizons on Slide 26
- The table shows the expected results over 10- and 20-year horizons
 - Over 10 years, Mix 4 achieves the newly lowered discount rate, adjusted for Callan's lower inflation rate (7.13%). However, Mix 4 exhibits greater volatility than the current target
 - The other mixes show greater allocations to fixed income, and lower volatility, at the cost of lower return
 - Over 20-year horizon, Mix 3 is expected to achieve the 7.13% return target, at lower risk than the target and Mix 4
- These asset mixes are used in the Monte Carlo simulation analysis

		PERS/TRS	Mix 1	Mix 2	Mix 3	Mix 4
	Broad US Equity	24.0	26.4	28.3	30.3	33.5
	Global ex US Equity	22.0	17.3	18.6	19.8	21.8
	Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
	Domestic Fixed	0.0	37.2	32.9	28.4	21.1
	Opportunistic	10.0	0.0	0.0	0.0	0.0
	Real Assets	17.0	7.1	7.5	8.0	8.8
	Hedge Funds	7.0	0.0	0.0	0.0	0.0
	Private Equity	9.0	11.0	11.7	12.5	13.8
	Cash Equivalents	1.0	1.0	1.0	1.0	1.0
	Totals	100.0	100.00	100.00	100.00	100.00
10-Year Projection	Projected Arithmetic Return	7.88%	7.16%	7.40%	7.65%	8.05%
	10-year Compound Return	7.01%	6.63%	6.77%	6.92%	7.13%
	Projected Standard Deviation	14.79%	11.97%	12.82%	13.70%	15.16%
20-Year Projection	Projected Arithmetic Return	8.07%	7.33%	7.58%	7.84%	8.27%
	20-Year Compound Return	7.20%	6.81%	6.97%	7.13%	7.36%
	Projected Standard Deviation	14.79%	11.97%	12.82%	13.70%	15.16%
	Equity	55.0%	54.7%	58.6%	62.6%	69.1%
	Inv Grade Fixed	10.0%	37.2%	32.9%	28.4%	21.1%
	Alts	33.0%	18.1%	19.2%	20.5%	22.6%

Impact of Lowering Risk Exposure on Range of Results

Expected case results vary meaningfully, but in the context of variable capital markets, it's the tails of the distribution that matter

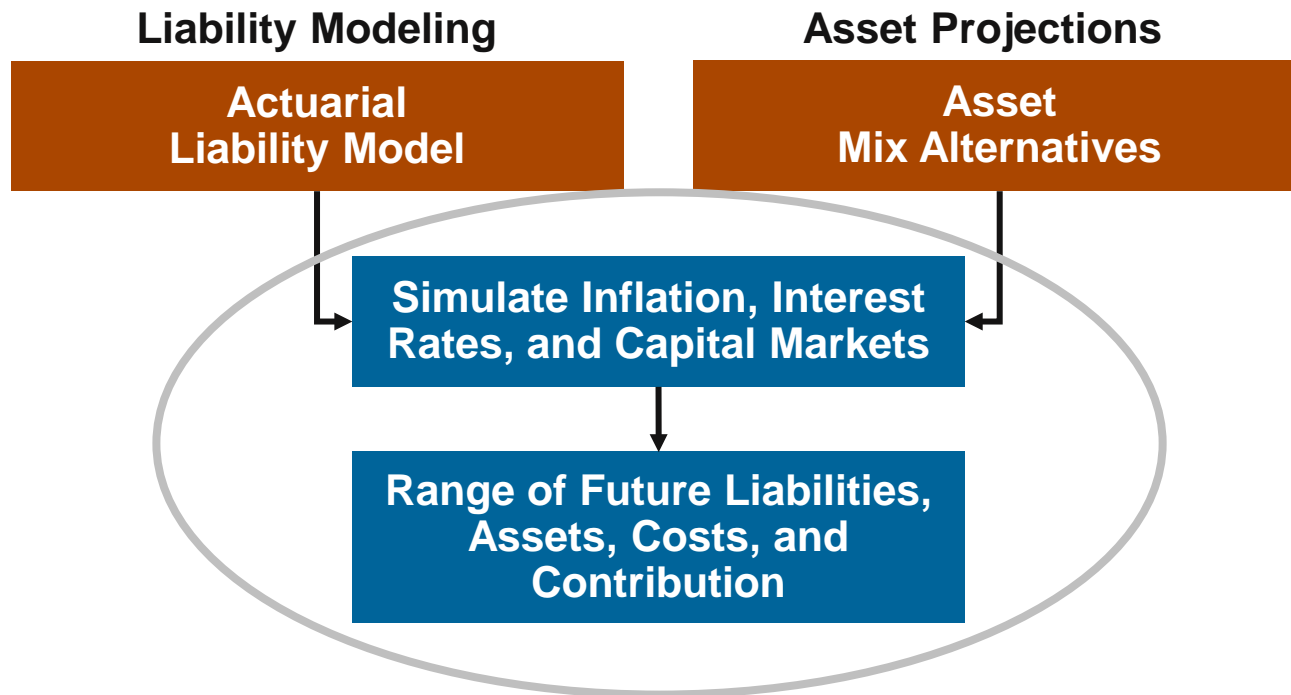
- Charts show range of simulated returns for one year (upper chart) and ten years (lower chart)
- Reducing risk over one year limits the worse case result (98th percentile)
- Note that these charts do not address sequence risk, that timing of a bad market matters. We address sequence risk in the Monte Carlo simulations.



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Simulated Financial Condition

Simulate Financial Condition



Generate 2,000 simulations per year, per asset mix to capture possible future economic scenarios and their effect on the portfolio

The simulation results are then ranked from highest to lowest to develop probability distributions

Projections are based on **actuarial and investment** assumptions and methodology

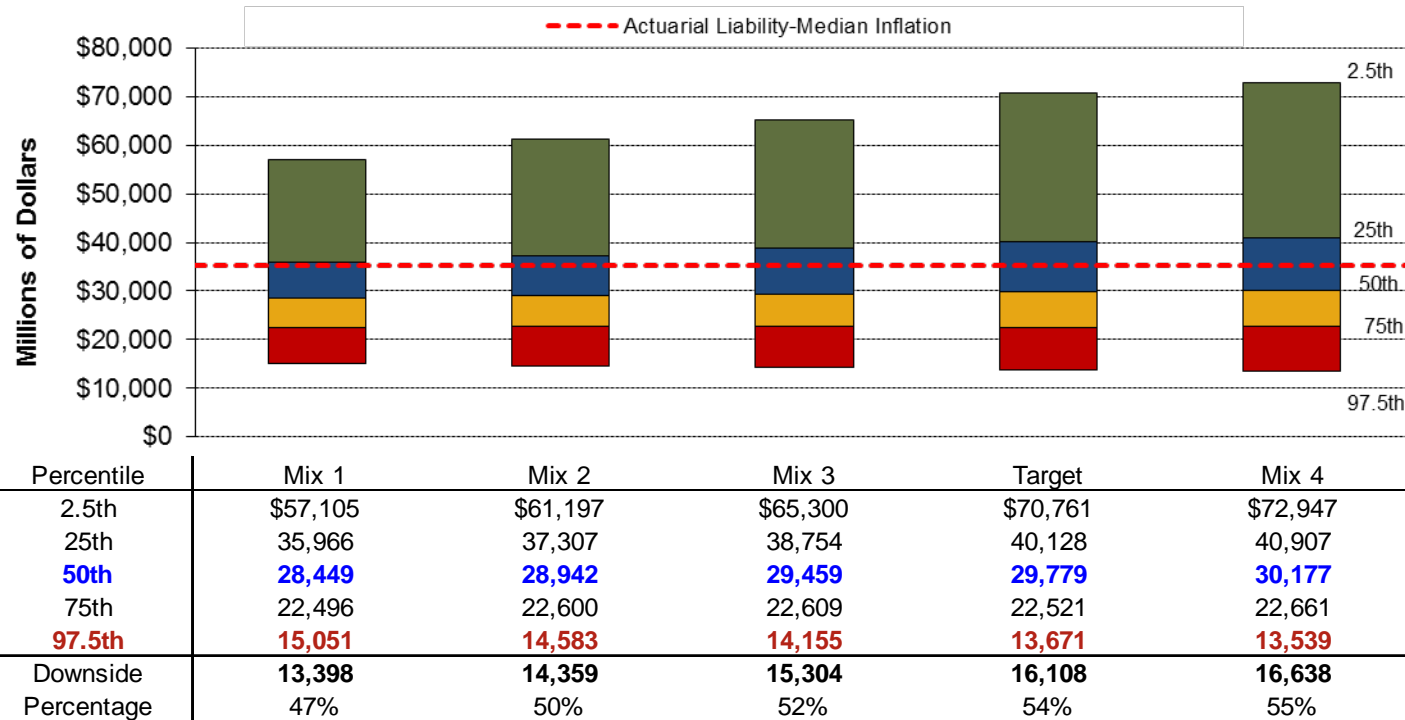
Target Mix and Mixes 1 – 4 are modeled

Liability Simulation – Combining Plans

- In prior asset/liability studies, the analyses suggest that ARMB consider one asset allocation for the combined assets of PERS and TRS
 - We conclude once again that the two systems should continue to consider one asset allocation target
 - The differences are less between PERS and TRS than between the pension and the medical plans within each system
 - *Medical benefits have been revised substantially since the last AL study and the plans are near full funding, while the pension plans are substantially less well funded*
 - Both PERS and TRS were modeled separately into their constituent parts – pension and medical – and simulated separately, and then all four plans were aggregated to produce results for the combination
 - In our detailed work with each plan, we believe the combination into one larger plan for evaluation and asset allocation purposes still makes sense
 - The large healthcare component is exposed to the risk of higher healthcare costs. The pension component is sensitive to wage inflation as well, to the extent it impacts salaries and pension adjustments in retirement. Over the long run, growth assets like equity as well as real assets such as real estate are generally accepted as the best hedges to unexpected inflation.

10-Year Ending (2028) Market Value of Assets – Combined Plans

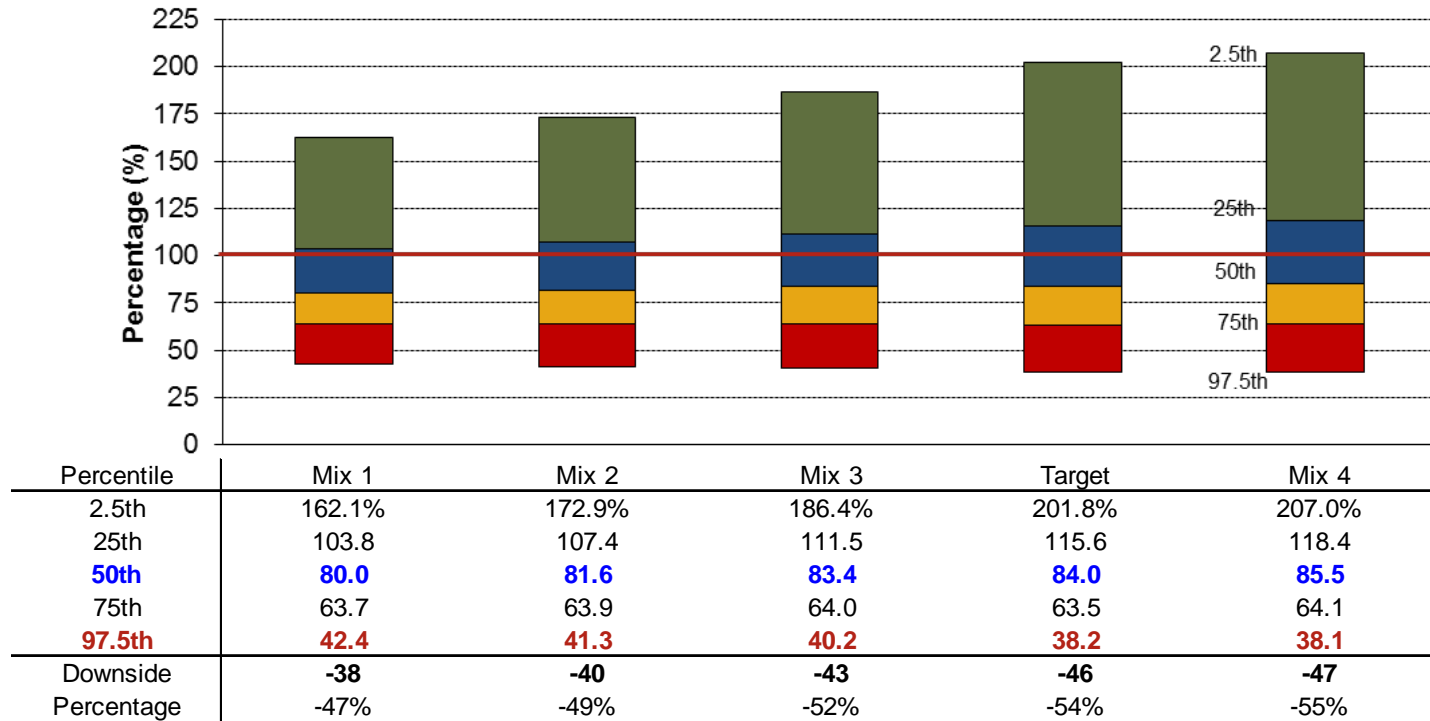
Target = current
policy for PERS
and TRS



- Capital market risk is reflected mainly in the market value of assets
- More conservative mixes have lower asset values in the 50th percentile
 - Higher expected returns lead to higher asset values
 - Larger contributions for lower returning mixes can make up some of the difference
- More aggressive mixes generally have lower asset values in the 97.5th percentile
 - Greater volatility means larger losses in down investment markets
 - Larger contributions for poorer performing mixes can make up some of the difference

10-Year Ending (2028) Market Funded Status – Combined Plans

Target = current
policy for PERS
and TRS

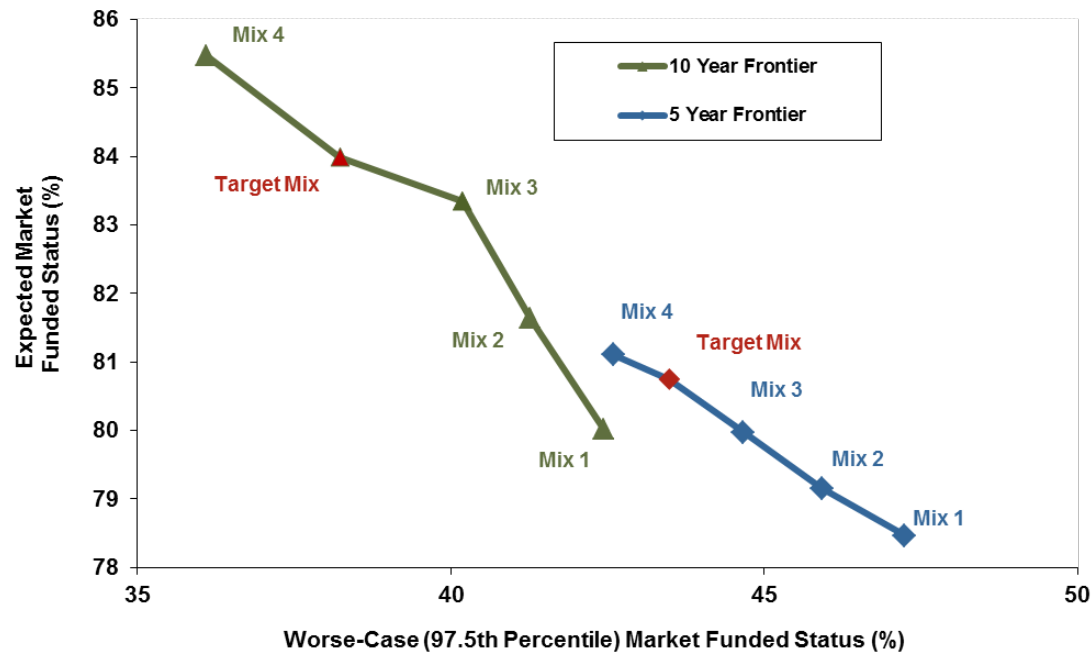


- Funded Status = Market Value of Assets / Accrued Liability
 - 2018 Market Funded Status = 78% for the combined plans
- Asset and liability experience is combined to determine funded status volatility; contributions kick in when funded status deteriorates, placing a floor under worse case funded status and muting the difference between mixes
- Funded Status in the median case (50th percentile) is expected to increase from current level of 78% over the next 10 years for all asset mixes
- Combined funded status is supported by the full funding of the medical plans; modest progress expected for pension plans assuming current funding policy

Funded Status Trade-Off – Combined Plans

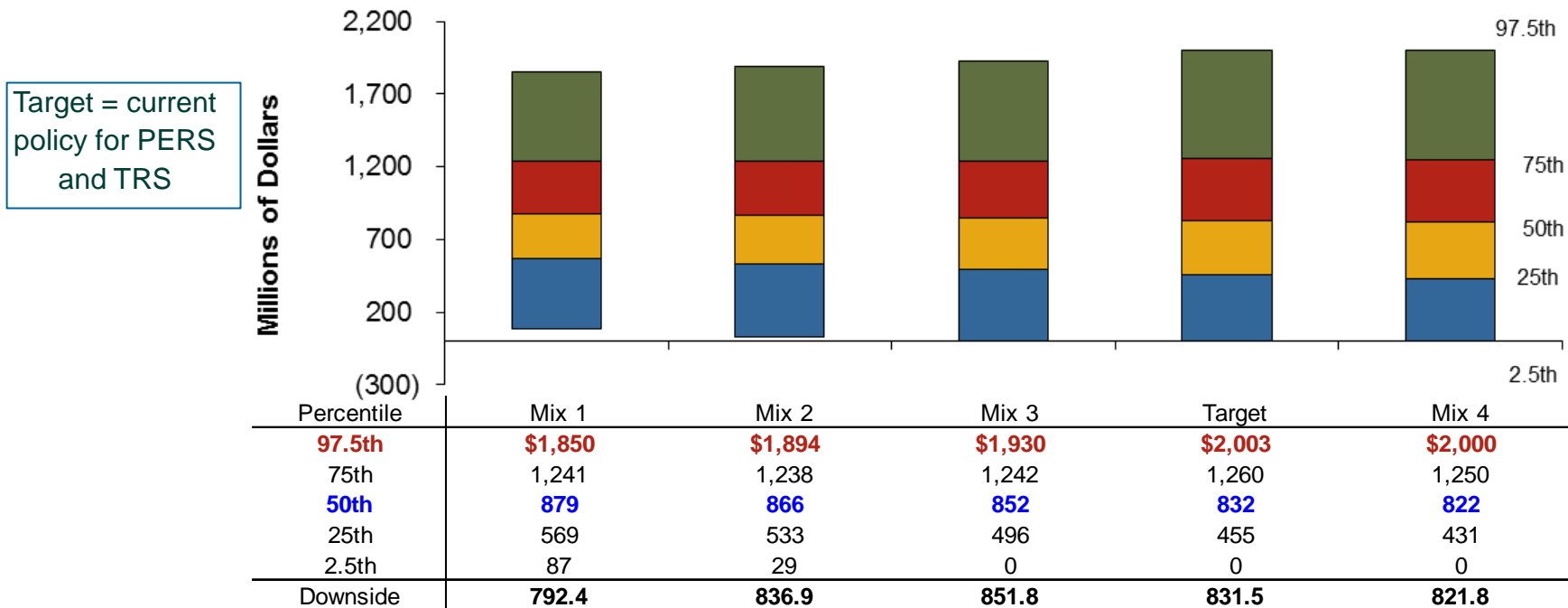
Market Funded Status – 5-Year and 10-Year Comparison

Target = current
policy for PERS
and TRS



- Expected (median) vs worse-case market funded status, similar to an efficient frontier
- The 5-Yr frontier is flatter suggesting a more conservative mixes like Mix 1 and Mix 2. The risk of a lower funded ratio in a worse-case scenario is greater than the gain in the expected case
- The 10-Yr frontier is steeper, suggesting a positive trade-off at least through Mix 3
 - The move from the Target to Mix 3 on the 10-year line is a positive move, the reverse move is not
 - Over long enough time horizons, the gain in the expected case balances the risk in a worse-case scenario, even in a less optimal trade-off; the challenge for a plan is being able to survive the short term pain and volatility that accompanies the promised higher return

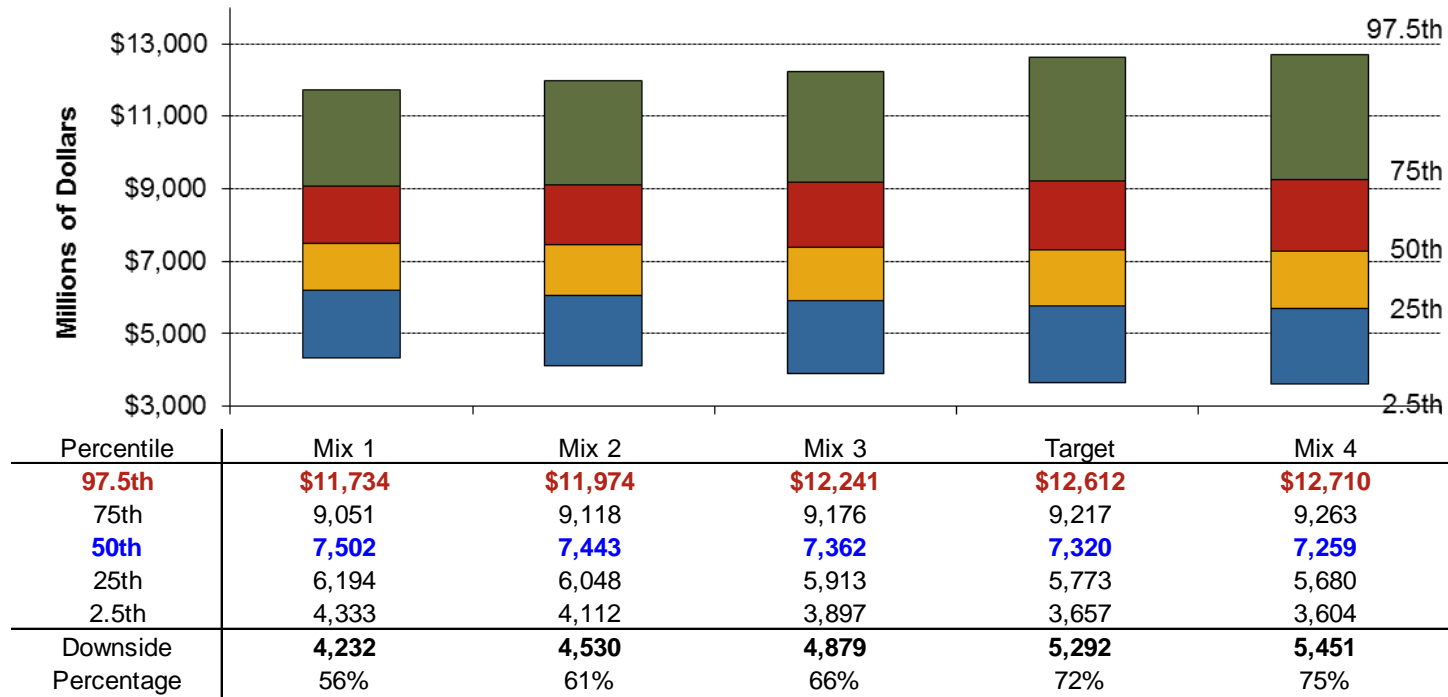
Employer Contributions in Ten Years (2028)– Combined Plans



- In the median (expected case), significant contributions are required in ten years under any of the alternative mixes given the current funded ratio for the pensions
- The wide range of potential contributions in just one year 10 years out illustrate the impact of capital market volatility on the Plans' financial condition; the Plans use smoothing via amortization of the unfunded, but the simulation clearly shows the potential impact of market volatility
- Contribution risk, as viewed as a worse-case scenario (97.5th percentile), doesn't appear to be significantly different in size across the mixes; of course, even the most conservative mix included (Mix 1) contains a strong tilt to growth assets

2019-2028 Cumulative Employer Contributions – Combined Plans

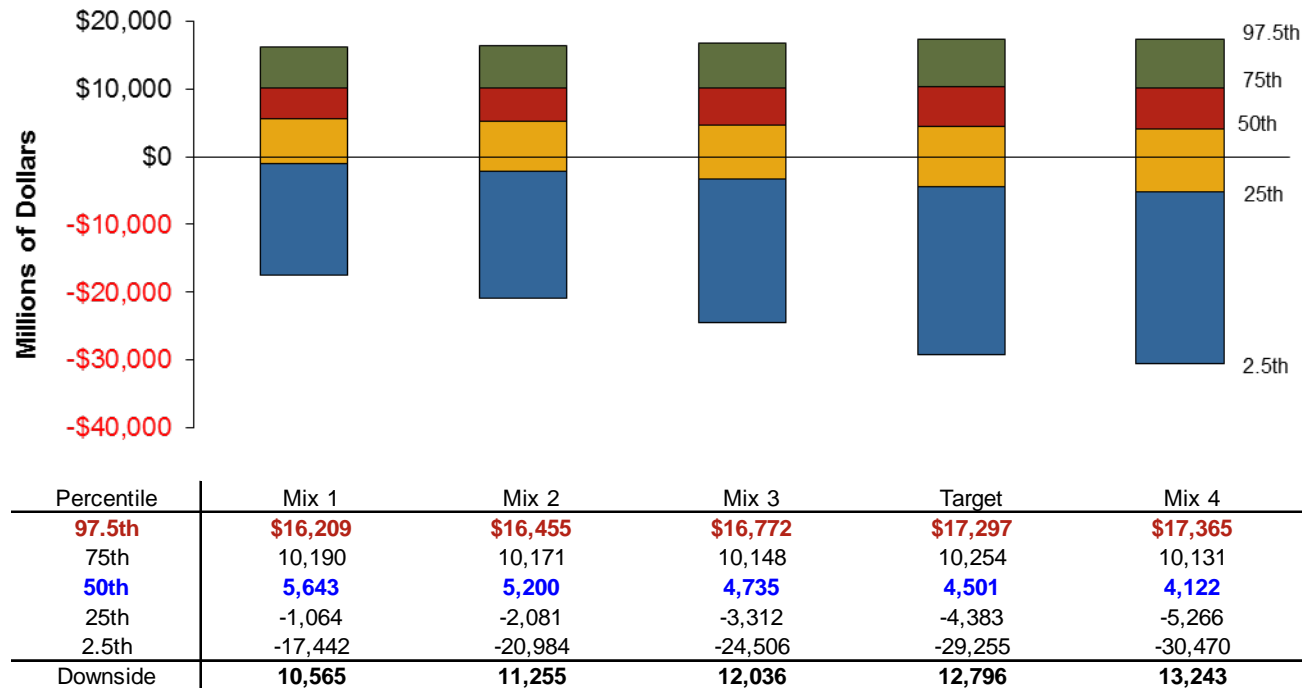
Target = current
policy for PERS
and TRS



- In the median (expected case), significant contributions are required over the next ten years under any of the alternative mixes given the current funded ratio for the pensions
- Contribution risk, as viewed as a worse-case scenario (97.5th percentile), doesn't appear to be significantly different in size across the mixes

2028 Unfunded Liability – Combined Plans

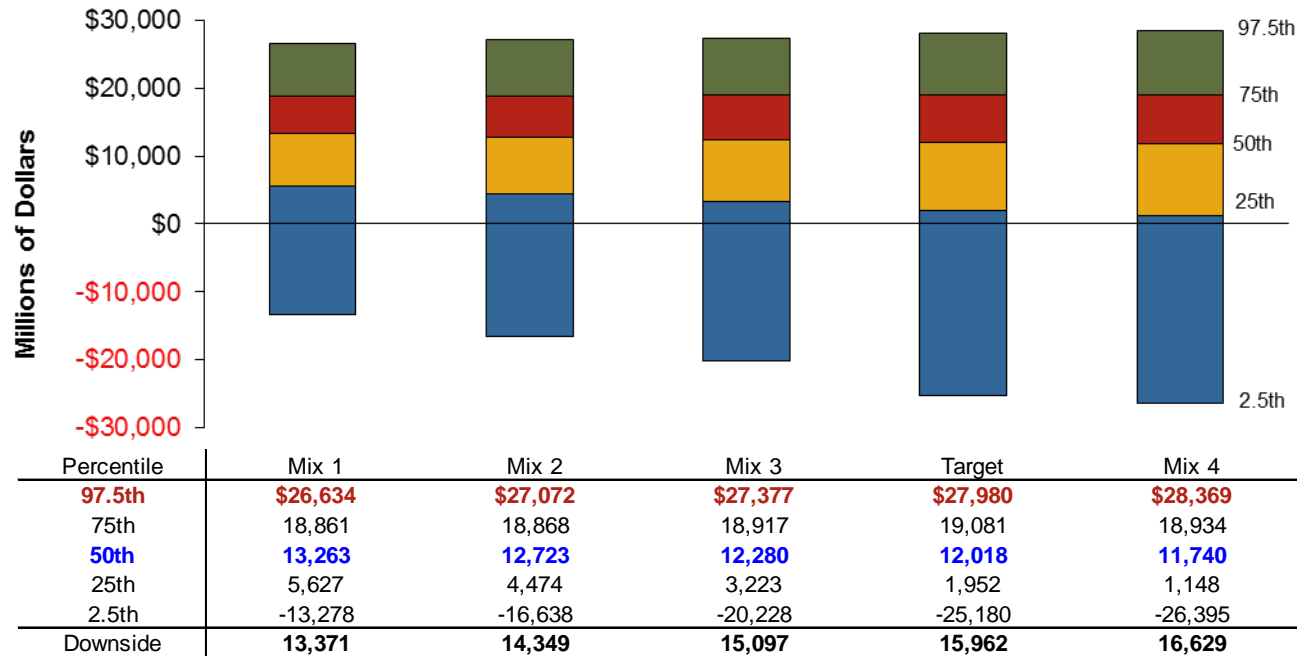
Target = current
policy for PERS
and TRS



- Unfunded Liability = Actuarial Accrued Liability – Market Assets
 - 2018 Unfunded Liability for combined plans = \$7.0 bb
- More aggressive mixes are better funded in the 50th percentile
 - Higher expected investment returns result in higher asset values given the liabilities
- More aggressive mixes are more poorly funded in the 97.5th percentile
 - Asset losses due to greater volatility leads to more underfunding
- Both plans are projected to make progress on the unfunded liability over the next ten years

Ultimate Net Cost – Combined Plans

Target = current
policy for PERS
and TRS



- Ultimate Net Cost (UNC) = 10-Year Cumulative Contributions + 2028 Unfunded Actuarial Liability
 - UNC captures what is expected to be paid over 10 years plus what is owed at the end of the 10 year period
 - Negative numbers indicate the plan is in a surplus position at 2028
 - More aggressive mixes lower UNC in the expected case but result in a greater UNC in a worse case scenario
- Mix 3 or Mix 4?
 - The improvement in UNC is a reduction of \$540 MM in the expected case when moving from Mix 3 to Mix 4; the worse-case result is the increase in the 97.5th percentile of \$992 MM
 - The \$540 MM reduction in the expected case is the reward, but the \$992 increase in the worse-case is the risk; the risk of Mix 4 over Mix 3 outweighs the reward
 - Mix 3 offers improvements over the current target in risk/reward trade-off: a larger reduction in risk for a small reduction in reward

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Making a Decision

Risk Metrics for ARMB

Simulation generates a range of potential outcomes for the financial condition of the Plans:

- Plan assets
- Liabilities
- Benefit payments
- Annual and cumulative dollar contributions
- Employer contribution
- Funded status

Key metric for ARMB:

- Contribution policy for employers: seeks strategies to stabilize financial condition of the plan, and therefore stabilize contributions over time

Summary Observations

- The liability and demographic profiles suggest that while both PERS and TRS are mature, closed and frozen, and the membership is aging, the Plans have a sufficiently long time horizon in which to assume investment risk
 - Expected cash flows and the long maturity and duration of the liabilities confirm the plan assets will be growing for some time and the time frame for the fund is decades, not just years
- Benefit payments are significant, but liquidity needs under the current funding policy are manageable and should not impact the Plan's asset allocation at this time
 - Net outflow is close to 5% and will rise gradually past 6% over the next 10 years
 - Current allocation to illiquid investments is 33% (real assets, private equity and hedge funds)
 - ARMB may wish to consider limiting illiquid asset exposure as the fund matures further
- Liability growth is moderate and slows to zero over the next 10 years
 - Median liability growth (net of benefit payments) falls to zero over the ten year horizon
 - Normal Cost is shrinking fast as the plan is closed and membership is aging
 - Active liability, as a percentage of *total* liability, falls from approximately 30% to below 15% over the next 10 years
 - Liability volatility stems from inflation uncertainty feeding through the unique benefit structure of PERS and TRS
- The current target is a well-diversified portfolio that includes exposure to stocks, bonds, private equity, real assets, hedge funds and a collection of diversifying strategies
 - However, the current target is less efficient than Mix 3 or Mix 4 (return per unit of risk) due to the large real asset allocation
 - Fixed income can be used as a source of liquidity in times of stress
 - *The current low allocation to fixed income (10% explicit, 15% effective) may introduce a liquidity constraint in a market downturn*
 - *The current allocation to illiquid strategies amounts to 1/3 of the portfolio, which*

Summary Observations, continued

- Current funding policy will contribute to progress toward funding improvement in the pensions, with substantial contributions expected over the next ten years
 - While the Plans employ smoothing in the amortization of the unfunded liability, our simulation results suggest that capital market risk subjects the required contributions to considerable volatility.
- Medical plans are projected to remain close to fully funded (PERS) and potentially overfunded (TRS) within the next few years and require substantially lower contribution than the pensions
 - The TRS medical plan is projected to generate surplus
- PERS and TRS need to pursue return in concert with the funding policy to maintain progress in closing the funding gap
 - Current target contains a very substantial tilt toward growth assets and illiquid alternative assets
 - Given the sensitivity of funded status and contribution to capital market risk, we would not recommend increasing the exposure to growth assets for PERS and TRS, and suggest that ARMB consider taking less risk in the investment program
- Short-term capital market expectations for return are weak relative to historical averages, forcing investors with a fixed return goal to risk up in pursuit
 - Extending the forecast horizon may enable the Plans to moderate exposure to risk assets while still meeting the Plans' return target over this longer horizon.
- A target mix similar to Mix 3 is expected to generate a long-term (20-year) return that meets the plan's 4.88% real return target, while lowering the risk posture from the current target portfolio, increasing the exposure to fixed income from the current effective 15% (Treasuries, cash and portion of opportunistic)
- Mixes with similar risk/return profiles as Mix 3 are explored in alternative optimizations, to balance the pursuit of a new strategy with the practical considerations of the current portfolio and the liquidity of the strategies within

Is the Current Risk Posture Appropriate?

Factor	Description	Supports risk taking?
Return Objective	<ul style="list-style-type: none"> Achieve the Investment Return Rate of 7.38% over the long-term 	Yes
Time Horizon	<ul style="list-style-type: none"> Closed, frozen plans, very mature but still with a very long time horizon to ultimate payout 	Yes
Liability Growth	<ul style="list-style-type: none"> Liabilities growth is projected to crest in the next 10 years, the inevitable result of maturing in a closed plan Normal cost is declining rapidly However, pension and healthcare benefits are sensitive to inflation 	Some
Funded Status	<ul style="list-style-type: none"> Funding gap is gradually improving and 10-year funded status is expected to rise under current funding policy and current target mix 2018 Market Funded status = 78% for combined plans 	Some*
Contribution Risk	<ul style="list-style-type: none"> Funding policy does reflect impact of poor investment results, and is therefore sensitive to capital market volatility 	Some

* Some Plan Sponsors lean on a more aggressive asset allocation to assist with closing a Plan deficit over the long run. Of course, a more aggressive asset allocation can make the financial situation worse, if investment performance is worse than expected.

Conclusions

- The current asset allocation is diversified among broad asset classes and built to help ARMB meet liabilities and objectives over the long-term
- PERS and TRS have made substantial progress since the last asset liability study was conducted in 2009, revising funding and benefits policy across all plans
- Funded status has improved primarily from a healthy contribution policy with the goal of reaching full funding
 - Investment results have been strong versus peers and the target benchmark, the result of a large exposure to growth assets within the portfolio
 - Both plans have also take steps to revise benefit structure, which has reduced expected plan liabilities
- Funded status volatility increases with riskier asset mixes; with a strong contribution policy and a long time horizon Callan suggests it may be prudent to reconsider the risk posture of the investment program
- A challenge is that the expected return of the current asset allocation is 7% over the next 10-years, which is below the objective of 4.88% real/7.13% nominal
 - Note that the 7% does not include an active management premium, which could make up the difference
 - Callan projects a 48% probability the current asset allocation will meet the return objective
 - The mix with an expected return that will meet the 7.13% return over the next 10 years is riskier the current target portfolio
 - Capital market expectations represent passive exposure (beta only) to the capital markets with the exception of private markets where objective benchmarks don't exist
 - *Private markets assets have some active management premium (alpha) embedded in the return expectation, which can help with the plan's reach for return*
- When considering risk the key factors ARMB should consider are:
 - What is the expected return in the median case versus the worst case?
 - How does investment volatility impact funded status in the median and worst case?
 - With a strong contribution policy already in place, what are the pros and cons of changing the risk profile of the assets?

Decision Metrics

Asset value – Slide 33; highest returning mix delivers the highest expected return

Funded status – Slides 34 and 34; trade-off between improvement in the expected case versus the worsening of the worst case suggests Mix 3 over the Current Target and Mix 4

Employer contribution – Slides 36 (contribution in year 10) and 37 (cumulative contributions over the next 10 years); trade-off between improvement in the expected case versus the worsening of the worst case suggests Mix 3 over the Current Target and Mix 4

Ultimate Net Cost – 10-Year Cumulative Contributions + 2028 Unfunded Actuarial Liability - Slide 39; trade-off between improvement in the expected case versus the worsening of the worst case suggests Mix 3 over the Current Target and Mix 4

Time horizon – Slides 12, 13, 15 and 16 – suggests the plans still have long investment time horizons, measured in decades rather than years

Asset Mix 3 - Slides 26, 27, 28 and 29 – efficient asset mix that meets the 7.13% nominal/4.88% real return target over a 20-year horizon

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June 23, 2019



ARMB 2019 Asset Allocation Strategy

Paul Erlendson
Fund Sponsor Consulting

Steven Center
Fund Sponsor Consulting

Jay Kloepper
Capital Market Research

2019 Callan Capital Market Projections

Risk and return: 2019–2028

		PROJECTED RETURN			PROJECTED RISK		2018 - 2027	
		1-Year Arithmetic	10-Year Geometric*	Real	Standard Deviation	Projected Yield	10-Year Geometric*	Standard Deviation
Asset Class	Index							
Equities								
Broad U.S. Equity	Russell 3000	8.50%	7.15%	4.90%	17.95%	2.00%	6.85%	18.25%
Large Cap	S&P 500	8.25%	7.00%	4.75%	17.10%	2.10%	6.75%	17.40%
Small/Mid Cap	Russell 2500	9.55%	7.25%	5.00%	22.65%	1.55%	7.00%	22.60%
Global ex-U.S. Equity	MSCI ACWI ex USA	9.20%	7.25%	5.00%	21.10%	3.10%	7.00%	21.00%
Non-U.S. Equity	MSCI World ex USA	8.70%	7.00%	4.75%	19.75%	3.25%	6.75%	19.70%
Emerging Markets Equity	MSCI Emerging Markets	10.70%	7.25%	5.00%	27.45%	2.65%	7.00%	27.45%
Fixed Income								
Short Duration	Bloomberg Barclays 1-3 Yr G/C	3.40%	3.40%	1.15%	2.10%	3.25%	2.60%	2.10%
U.S. Fixed	Bloomberg Barclays Aggregate	3.75%	3.75%	1.50%	3.75%	3.85%	3.00%	3.75%
Long Duration	Bloomberg Barclays Long G/C	4.25%	3.75%	1.50%	10.65%	4.80%	3.00%	10.95%
TIPS	Bloomberg Barclays TIPS	3.80%	3.75%	1.50%	5.05%	3.90%	3.00%	5.25%
High Yield	Bloomberg Barclays High Yield	5.75%	5.35%	3.10%	10.35%	7.75%	4.75%	10.35%
Non-U.S. Fixed	Bloomberg Barclays Gbl Agg ex US	1.80%	1.40%	-0.85%	9.20%	2.35%	1.40%	9.20%
Emerging Market Debt	EMBI Global Diversified	5.40%	5.05%	2.80%	9.50%	6.00%	4.50%	9.60%
Other								
Real Estate	NFI-ODCE	7.30%	6.25%	4.00%	15.70%	4.75%	5.75%	16.35%
Private Equity	Cambridge Private Equity	12.40%	8.50%	6.25%	29.30%	0.00%	7.35%	32.90%
Hedge Funds	Callan Hedge FOF Database	5.75%	5.50%	3.25%	8.85%	2.50%	5.05%	9.15%
Commodities	Bloomberg Commodity	4.75%	3.20%	0.95%	18.00%	2.50%	2.65%	18.30%
Cash Equivalents	90-Day T-Bill	2.50%	2.50%	0.25%	0.90%	2.50%	2.25%	0.90%
Inflation	CPI-U		2.25%		1.50%		2.25%	1.50%

Note that return projections for public markets assume index returns with no premium for active management.

* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Source: Callan

2019 Callan Capital Market Projections

Correlation: 2019–2028

Broad U.S. Eq	1.00																			
Large Cap	1.00	1.00																		
Small/Mid Cap	0.96	0.93	1.00																	
Global ex-U.S. Eq	0.85	0.84	0.84	1.00																
Non-U.S. Eq	0.81	0.80	0.80	0.99	1.00															
Em Market Eq	0.87	0.86	0.86	0.94	0.88	1.00														
Short Duration	-0.23	-0.22	-0.26	-0.25	-0.23	-0.28	1.00													
U.S. Fixed	-0.11	-0.10	-0.15	-0.14	-0.12	-0.17	0.88	1.00												
Long Duration	0.11	0.11	0.10	0.08	0.09	0.04	0.74	0.93	1.00											
TIPS	-0.05	-0.04	-0.08	-0.06	-0.05	-0.09	0.56	0.64	0.53	1.00										
High Yield	0.64	0.63	0.62	0.63	0.61	0.62	-0.13	0.02	0.19	0.06	1.00									
Non-U.S. Fixed	0.01	0.01	0.00	0.07	0.05	0.10	0.48	0.53	0.54	0.40	0.12	1.00								
Em Market Debt	0.57	0.57	0.55	0.57	0.54	0.58	-0.04	0.10	0.20	0.18	0.60	0.01	1.00							
Real Estate	0.74	0.73	0.72	0.71	0.68	0.70	-0.13	-0.04	0.17	0.00	0.56	-0.05	0.47	1.00						
Private Equity	0.92	0.92	0.88	0.88	0.86	0.86	-0.30	-0.23	-0.01	-0.14	0.55	0.06	0.45	0.66	1.00					
Hedge Funds	0.76	0.76	0.74	0.74	0.72	0.73	-0.08	0.09	0.29	0.09	0.57	-0.05	0.54	0.64	0.62	1.00				
Commodities	0.15	0.15	0.15	0.16	0.16	0.16	-0.22	-0.10	-0.04	0.12	0.10	0.15	0.19	0.20	0.18	0.21	1.00			
Cash Equivalent	-0.04	-0.03	-0.08	-0.04	-0.01	-0.10	0.30	0.10	-0.04	0.12	-0.11	0.00	-0.07	-0.06	0.00	-0.07	0.07	1.00		
Inflation	-0.01	-0.02	0.02	0.01	0.00	0.03	-0.20	-0.28	-0.29	0.10	0.07	-0.10	0.00	0.10	0.06	0.20	0.40	0.00	1.00	
	Broad U.S. Eq	Large Cap	Small/Mid Cap	Global ex-U.S. Eq	Non-U.S. Eq	Em Market Eq	Short Duration	U.S. Fixed	Long Duration	TIPS	High Yield	Non-U.S. Fixed	Em Market Debt	Real Estate	Private Equity	Hedge Funds	Comm	Cash Equiv	Inflation	

- Relationships between asset classes are as important as standard deviation
- To determine portfolio mixes, Callan employs mean-variance optimization
- Return, standard deviation and correlation determine the composition of efficient asset mixes

Source: Callan

Customized ARMB Capital Market Projections

ARMB Asset Allocation Model 2019-2028

Asset Class	Target Weight	PROJECTED RETURN		PROJECTED RISK	
		1-Year Arithmetic	10-Year Geometric Return	Annualized Standard Deviation	Projected Yield
Public Equities	46.0%				
Broad US Equity	24.0%	8.50%	7.15%	18.00%	2.00%
Global Ex-US Equity	22.0%	9.20%	7.25%	21.10%	3.10%
Fixed Income	10.0%				
Intermediate Treasuries	10.0%	3.40%	3.40%	2.90%	3.30%
Opportunistic	10.0%				
Opportunistic	10.0%	6.45%	6.10%	10.20%	2.80%
Private Equity	9.0%				
Private Equity	9.0%	12.40%	8.50%	29.30%	0.00%
Real Assets	17.0%	7.60%	6.75%	14.25%	4.70%
Real Estate	6.0%	7.30%	6.25%	15.70%	4.75%
Timber	1.7%	7.10%	6.20%	14.55%	3.90%
Farmland	4.3%	7.20%	6.25%	15.00%	4.50%
Private Infrastructure	3.0%	8.15%	6.75%	18.00%	5.00%
MLPs	2.1%	8.70%	6.80%	20.70%	5.00%
Absolute Return	7.0%				
Hedge Funds	7.0%	5.75%	5.50%	8.85%	2.25%
Cash Equivalents	1.0%				
Cash Equivalents	1.0%	2.50%	2.50%	0.90%	2.50%
Inflation			2.25%	1.50%	
Total Fund	100.0%	7.88%	7.00%	14.80%	2.75%

Projection set customized to reflect specific ARMB strategies:

- Real assets, opportunistic and intermediate Treasuries (instead of broad market fixed income)

Current target projected to generate a return of 7% compounded over 10 years, at a risk (standard deviation) of 14.8%

Portfolio Considerations for the Asset-Liability Study

Fundamental Setting of the Tolerance for Risk

Current ARMB implementation for PERS and TRS is the same, across both pension and medical benefits.

Current portfolio has 10% allocated to fixed income, another 4% implied in the opportunistic bucket (plus 1% in cash), which is low relative to peers and relative to diversified portfolios over history

- 85% of the portfolio is in growth-oriented assets, although not all strategies are equity risk
- 85/15 exposes the PERS and TRS Plans to substantial capital growth potential, at the expense of substantial volatility and the potential for sharp drawdowns in adverse markets
- Current target has a relatively large (17%) exposure to real assets, anchored by 6% in private real estate, with benchmark exposures to timber, farmland, infrastructure and MLPs.
- Target includes 7% to hedge funds and 9% to private equity. Total alternatives target is 33% of fund assets.

Public funds have been “cornered” by low shorter-term capital market expectations in the face of unchanging need for asset growth to fund benefits

- Unintended consequence has been a relentless risking-up of portfolios in search of return
- Accompanied by extensive diversification into uncorrelated sources of return in less liquid, less frequently valued, private market investments
- As a result, many public funds have developed portfolios that may not be well positioned in a sharp market downturn, and may face liquidity challenges even in normal markets, but particularly in a crisis when liquidity needs remain (benefit payments, rebalancing)

How long should the time horizon be for strategic planning and setting asset allocation policy?

Expanding the Length of the Forecast Horizon

10-Year vs. Equilibrium Capital Market Expectations

- As the time horizon grows beyond 10 years, our capital market expectations increasingly incorporate “equilibrium returns”. Equilibrium returns reference **long-term historical mean results**, with an overlay of informed judgment. Key elements to consider:
 - Nominal returns
 - Inflation
 - Real returns
 - Risk premium – bonds over cash, stocks over bonds, long duration over short
 - Long-term underlying economic growth (real GDP)
- 10-Year expectations:
 - Large Cap Stocks: 7.0% nominal, 4.75% real, 3.25% premium over bonds
 - Bonds: 3.75% nominal, 1.50% real, 1.25% premium over cash
 - Cash: 2.50% nominal, 0.25% real
 - Inflation: 2.25%
 - Underlying economic growth (real GDP) – 2 to 2.5% per year
- Equilibrium expectations:
 - Large Cap Stocks: 8.25% nominal, 6.0% real, 3.25% premium over bonds
 - Bonds: 5% nominal, 2.75% real, 1.75% premium over cash
 - Cash: 3.25% nominal, 1.0% real
 - Inflation: 2.25%
 - Underlying economic growth (real GDP) – 3% per year

As Time Horizon Increases, Expected Returns Increase

Transition from 10-Year to 20-Year Horizon – Heading Toward LT Equilibrium

AssetClass	2019-2028 10-Year Annualized Return	2019-2038 20-Year Annualized Return	2019-2043 25-Year Annualized Return	2019-2048 30-Year Annualized Return	Long-Term Annualized Equilibrium Return	Projected Standard Deviation
Broad US Equity	7.15%	7.30%	7.50%	7.70%	8.45%	17.97%
Large Cap	7.00%	7.15%	7.35%	7.50%	8.25%	17.10%
Small/Mid Cap	7.25%	7.60%	7.85%	8.10%	9.05%	22.65%
Global ex US Equity	7.25%	7.50%	7.70%	7.95%	8.75%	21.08%
International Equity	7.00%	7.10%	7.30%	7.50%	8.25%	19.75%
Emerging Markets Equity	7.25%	7.90%	8.15%	8.40%	9.50%	27.45%
Intermediate Treasuries	3.40%	3.40%	3.45%	3.50%	4.00%	2.90%
Domestic Fixed	3.75%	3.75%	3.85%	4.00%	5.00%	3.75%
Opportunistic	6.10%	6.15%	6.30%	6.45%	7.30%	10.22%
Real Estate	6.25%	6.25%	6.40%	6.50%	7.00%	15.70%
Timber	6.20%	6.55%	6.65%	6.75%	7.20%	14.55%
Farmland	6.25%	6.55%	6.65%	6.85%	7.30%	15.00%
Infrastructure, private	6.75%	6.75%	6.85%	7.00%	7.40%	18.00%
MLP	6.80%	7.00%	7.25%	7.50%	8.00%	20.70%
Real Assets	6.75%	6.90%	7.05%	7.20%	7.65%	14.25%
Hedge Funds	5.50%	5.50%	5.50%	5.50%	6.10%	8.85%
Private Equity	8.50%	9.30%	9.40%	9.50%	10.00%	29.30%
Cash Equivalents	2.50%	2.50%	2.65%	2.85%	3.25%	0.90%
Inflation	2.25%	2.25%	2.25%	2.25%	2.25%	1.50%

Diversified Portfolios Including Alternative Asset Classes

Achieve 4.88% Real Return over 10-, 20-, 25- and 30-Year Horizons

- Portfolios optimized using broad US and non-US equity, broad US fixed income, as well as real assets and private equity
- Absolute Return and Opportunistic not included in the alternative portfolios for modeling
 - Opportunistic is benchmarked 60/40 to public market stocks and bonds
 - Absolute Return/Hedge Fund Program is expected to be discontinued
- Private equity limited to no more than 25% of the sum of total public equity
- Real assets modeled using current target weights to each component within the total real asset composite
- Less exposure to equity is required to meet the 7.13 return target over longer time horizons, with higher expected return

Asset Classes	10 Years	20 Years	25 Years	30 Years
Broad Domestic Equity	33.5%	30.3%	28.3%	26.4%
Global ex US Equity	21.8%	19.8%	18.6%	17.3%
Fixed Income	21.1%	28.4%	32.9%	37.2%
Real Assets	8.8%	8.0%	7.5%	7.1%
Private Equity	13.8%	12.5%	11.7%	11.0%
Cash Equivalents	1.0%	1.0%	1.0%	1.0%
Totals	100%	100%	100%	100%

10-Year Projection	Uncompounded Return (Arithmetic)	8.05%
	10-Year Compounded Return	7.13%
	10-Year Real Return	4.88%
	Standard Deviation	15.16%

20-Year Projection	Uncompounded Return (Arithmetic)	7.84%
	20-Year Compounded Return	7.13%
	20-Year Real Return	4.88%
	Standard Deviation	13.70%

25-Year Projection	Uncompounded Return (Arithmetic)	7.73%
	25-Year Compounded Return	7.13%
	25-Year Real Return	4.88%
	Standard Deviation	12.82%

30-Year Projection	Uncompounded Return (Arithmetic)	7.64%
	30-Year Compounded Return	7.13%
	30-Year Real Return	4.88%
	Standard Deviation	11.97%

Focus on 20-Year Time Horizon

Compare Return and Risk for Diversified and Public Markets-Only Portfolios

- Duration, cash flows and demographic forecasts suggest the investment time horizon for PERS and TRS remains long
- Current 10-year capital market forecasts can lead investors to take on substantial risk to meet a fixed return goal
- Extending the forecast horizon may enable the plans to moderate exposure to risk assets while still meeting the return target over this longer horizon
- Use a 20-year horizon to develop a potential asset mix target that meets the real return goal but allows alternative risk posture for the plans
- Use the asset mixes developed on slide 7 to articulate a range of potential alternatives to evaluate
 - Mix 4 corresponds to 10 years, Mix 1 corresponds to 30 years
- Mix 3 shown at left is expected to generate a long-term (20-year) return that meets the plan's real return target

Asset Classes	Public Markets	Mix 3
Broad Domestic Equity	45.1%	30.3%
Global ex US Equity	29.5%	19.8%
Fixed Income	25.4%	28.4%
Real Assets	0.0%	8.0%
Private Equity	0.0%	12.5%
Cash Equivalents	0.0%	1.0%
Totals	100%	100%

20-Year Projection	Uncompounded Return (Arithmetic)	7.64%	7.84%
	20-Year Compounded Return	6.91%	7.13%
	20-Year Real Return	4.66%	4.88%
	Standard Deviation	13.70%	13.70%

Portfolios to Consider – 20 Year Time Horizon

10- and 20-year Projections

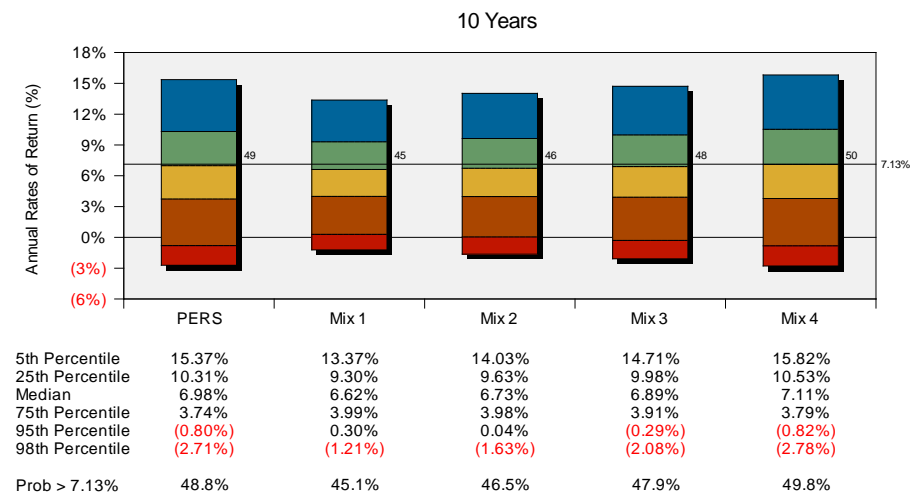
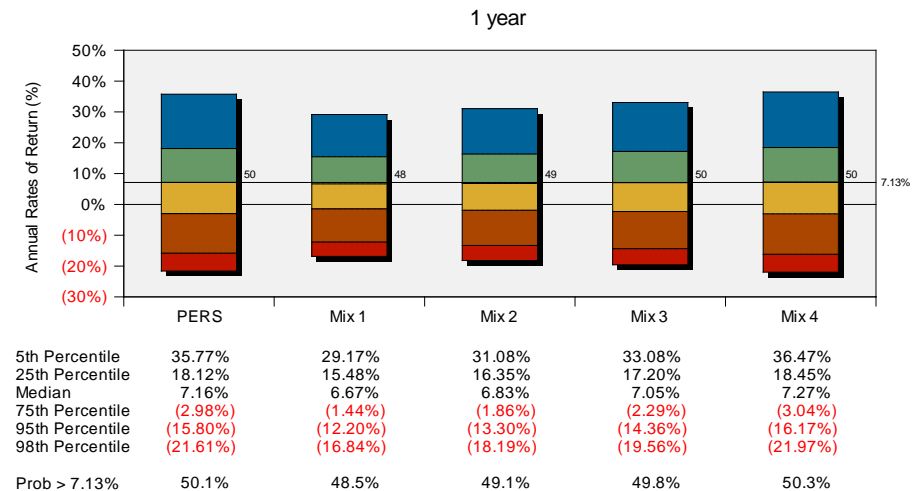
- Purpose of asset-liability study is to set the broad tolerance for investment risk
- ARMB could consider a less risky posture for the fund, balancing the need for return with the maturity of Plans' liabilities and the size of the potential drawdown an 85/15 exposure (current target) represents.
- PERS modeled with intermediate Treasuries as fixed income; alternative mixes use the Aggregate
- The alternative portfolios correspond to the mixes that generate the target return across different time horizons on Slide 7
- The table shows the expected results over 10- and 20-year horizons
 - Over 10 years, Mix 4 achieves the newly lowered discount rate, adjusted for Callan's lower inflation rate (7.13%). Mix 4 exhibits greater volatility than the current target
 - The other mixes show greater allocations to fixed income, and lower volatility, at the cost of lower return
 - Over 20 years, Mix 3 is expected to achieve the 7.13% return target, at lower risk than the target and Mix 4
- These asset mixes are used in the Monte Carlo simulation analysis

		PERS	Mix 1	Mix 2	Mix 3	Mix 4
	Broad US Equity	24.0	26.4	28.3	30.3	33.5
	Global ex US Equity	22.0	17.3	18.6	19.8	21.8
	Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
	Domestic Fixed	0.0	37.2	32.9	28.4	21.1
	Opportunistic	10.0	0.0	0.0	0.0	0.0
	Real Assets	17.0	7.1	7.5	8.0	8.8
	Hedge Funds	7.0	0.0	0.0	0.0	0.0
	Private Equity	9.0	11.0	11.7	12.5	13.8
	Cash Equivalents	1.0	1.0	1.0	1.0	1.0
	Totals	100.0	100.00	100.00	100.00	100.00
10-Year Projection	Projected Arithmetic Return	7.88%	7.16%	7.40%	7.65%	8.05%
	10-year Compound Return	7.01%	6.63%	6.77%	6.92%	7.13%
	Projected Standard Deviation	14.79%	11.97%	12.82%	13.70%	15.16%
20-Year Projection	Projected Arithmetic Return	8.07%	7.33%	7.58%	7.84%	8.27%
	20-Year Compound Return	7.20%	6.81%	6.97%	7.13%	7.36%
	Projected Standard Deviation	14.79%	11.97%	12.82%	13.70%	15.16%
	Equity	55.0%	54.7%	58.6%	62.6%	69.1%
	Inv Grade Fixed	10.0%	37.2%	32.9%	28.4%	21.1%
	Alts	33.0%	18.1%	19.2%	20.5%	22.6%

Impact of Lowering Risk Exposure on Range of Results

Expected case results vary meaningfully, but in the context of variable capital markets, it's the tails of the distribution that matter

- Charts show range of simulated returns for one year (upper chart) and ten years (lower chart)
- Reducing risk over one year limits the worse case result (98th percentile)
- Note that these charts do not address sequence risk, that timing of a bad market matters. We address sequence risk in the Monte Carlo simulations.



Focus on 20-Year Time Horizon – Implementation Alternatives

- Mix 3 is expected to meet the 7.13 nominal/4.88 real return target over a 20 year horizon
- The asset-liability analysis points to Mix 3 as a reasonable alternative
- Alternative optimizations for implementing a portfolio with a similar risk profile to Mix 3:
 - **Mix 3** is the “unconstrained” mix that meets the 7.13% nominal target over 20 years
 - **Mix 3+HF** is the unconstrained mix that includes absolute return (labeled hedge funds) that targets 7.13%
 - **Constrain RE & PE** limits real assets to a maximum of 13% and private equity to 11% in a mix that targets 7.13%
 - The **Public Market Proxy** portfolio uses only public market asset classes to generate a portfolio with the same risk as the Constrained RE and PE portfolio
- Opportunistic is benchmarked to 60/40 stocks and bonds. The allocation may be retained at 8%; the lower table carves the weighting out of the stock and bond allocations pro-rata

20-year projection

	PERS	Mix 3	Mix 3+HF	Constrain RE & PE	Public Market Proxy
Broad US Equity	24.0	30.3	30.3	28.8	45.5
Global ex US Equity	22.0	19.8	19.8	20.4	29.8
Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
Domestic Fixed	0.0	28.4	26.0	25.8	24.8
Opportunistic	10.0	0.0	0.0	0.0	0.0
Real Assets	17.0	8.0	5.8	13.0	0.0
Hedge Funds	7.0	0.0	4.6	0.0	0.0
Private Equity	9.0	12.5	12.5	11.0	0.0
Cash Equivalents	1.0	1.0	1.0	1.0	0.0
Totals	100.00	100.00	100.00	100.00	100.00
Projected Arithmetic Return	8.07%	7.84%	7.85%	7.86%	7.68%
20-year Compound Return	7.20%	7.13%	7.13%	7.13%	6.93%
Projected Standard Deviation	14.79%	13.70%	13.73%	13.82%	13.82%
Equity	55.0%	62.6%	62.6%	60.2%	75.2%
Inv Grade Fixed	10.0%	28.4%	26.0%	25.8%	24.8%
Alts	33.0%	20.5%	22.9%	24.0%	0.0%

Include 8% Opportunistic

	PERS	Mix 3	Mix 3+HF	Constrain RE & PE	Public Market Proxy
Broad US Equity	24.0	27.9	27.9	26.4	45.5
Global ex US Equity	22.0	17.4	17.4	18.0	29.8
Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
Domestic Fixed	0.0	25.2	22.8	22.6	24.8
Opportunistic	10.0	8.0	8.0	8.0	0.0
Real Assets	17.0	8.0	5.8	13.0	0.0
Hedge Funds	7.0	0.0	4.6	0.0	0.0
Private Equity	9.0	12.5	12.5	11.0	0.0
Cash Equivalents	1.0	1.0	1.0	1.0	0.0
Totals	100.00	100.00	100.00	100.00	100.00
Projected Arithmetic Return	8.07%	7.84%	7.85%	7.86%	7.68%
20-year Compound Return	7.20%	7.13%	7.13%	7.13%	6.93%
Projected Standard Deviation	14.79%	13.70%	13.73%	13.82%	13.82%
Equity	55.0%	57.8%	57.8%	55.4%	75.2%
Inv Grade Fixed	10.0%	25.2%	22.8%	22.6%	24.8%
Alts	33.0%	20.5%	22.9%	24.0%	0.0%

Implementation Considerations

Alternative portfolios suggest potential asset shifts that may take time to implement.

- Mix 3:
 - Substantial increase in fixed income, shift to broad market bond portfolio
 - Increase private equity
 - Eliminate absolute return
 - Reduce real assets
- Mix 3+HF:
 - Retain HF exposure in a mix similar to Mix 3
- Mix 3 Constrain RE & PE:
 - Retain exposure to real assets closer to current
 - Substantial increase in fixed income, shift to broad market bond portfolio
 - Increase private equity
 - Eliminate absolute return
- Real asset portfolio may change in composition, return and risk expected to remain similar to composite used here

Militia Asset Mix Alternatives

Asset Mix Return and Risk: 20-Year Time Horizon

Asset Classes	Militia	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
Broad US Equity	27%	17%	20%	23%	26%	30%
Global ex US Equity	18%	15%	17%	19%	21%	22%
Domestic Fixed	45%	60%	55%	50%	45%	40%
Opportunistic	10%	8%	8%	8%	8%	8%
Cash Equivalents	0%	0%	0%	0%	0%	0%
Totals	100%	100%	100%	100%	100%	100%
Uncompounded Return	6.4%	5.7%	5.9%	6.2%	6.4%	6.7%
20-Year Compounded Return	6.1%	5.5%	5.8%	6.0%	6.1%	6.3%
Risk (Standard Deviation)	9.3%	6.9%	7.7%	8.6%	9.5%	10.4%
20-Year Real Return	3.7%	3.2%	3.4%	3.6%	3.8%	4.0%
Public Equity	45%	32%	37%	42%	47%	52%
Public Fixed	45%	60%	55%	50%	45%	40%

- Central expectation over 20 years is a 6.1% return

Source: Callan Associates

Callan

Appendix

Focus on 10-Year Time Horizon – Implementation Alternatives

- Mix 4 is expected to meet the 7.13 nominal/4.88 real return target over a 10 year horizon
- Alternative optimizations for implementing a portfolio similar to Mix 4 are displayed in the table
 - Mix 4 is the “unconstrained” mix that meets the 7.13% nominal target over 10 years
 - Mix 4+HF is the unconstrained mix that includes absolute return (labeled hedge funds) that meets 7.13%
 - The third Mix constrains real assets to a maximum of 13% and private equity to 11% in a mix that meets 7.13%
 - The Public Market Proxy uses only public market asset classes to generate a portfolio with the same risk as the Constrained RE and PE portfolio

10-year projection

	PERS	Mix 4	Mix 4+HF	Constrain RE & PE	Public Market Proxy
Broad US Equity	24.0	33.5	33.4	34.1	50.5
Global ex US Equity	22.0	21.8	21.8	23.5	33.1
Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
Domestic Fixed	0.0	21.1	19.0	17.4	16.5
Opportunistic	10.0	0.0	0.0	0.0	0.0
Real Assets	17.0	8.8	6.7	13.0	0.0
Hedge Funds	7.0	0.0	4.3	0.0	0.0
Private Equity	9.0	13.8	13.8	11.0	0.0
Cash Equivalents	1.0	1.0	1.0	1.0	0.0
Totals	100.00	100.00	100.00	100.00	100.00
Projected Arithmetic Return	7.88%	8.05%	8.05%	8.09%	7.96%
10-year Compound Return	7.01%	7.13%	7.13%	7.13%	6.99%
Projected Standard Deviation	14.79%	15.16%	15.16%	15.39%	15.39%
Equity	55.0%	69.1%	69.0%	68.6%	83.6%
Inv Grade Fixed	10.0%	21.1%	19.0%	17.4%	16.5%
Alts	33.0%	22.6%	24.8%	24.0%	0.0%

Focus on 25-Year Time Horizon – Implementation Alternatives

- Mix 2 is expected to meet the 7.13 nominal/4.88 real return target over a 25 year horizon
- Alternative optimizations for implementing a portfolio similar to Mix 2 are displayed in the table
 - Mix 2 is the “unconstrained” mix that meets the 7.13% nominal target over 25 years
 - Mix 2+HF is the unconstrained mix that includes absolute return (labeled hedge funds) that meets 7.13%
 - The third Mix constrains real assets to a maximum of 13% and private equity to 11% in a mix that meets 7.13%
 - The Public Market Proxy uses only public market asset classes to generate a portfolio with the same risk as the Constrained RE and PE portfolio

25-year projection

	PERS	Mix 2	Mix 2+HF	Constrain RE & PE	Public Market Proxy
Broad US Equity	24.0	28.3	28.5	26.8	42.4
Global ex US Equity	22.0	18.6	18.7	17.6	27.7
Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
Domestic Fixed	0.0	32.9	30.2	30.9	30.0
Opportunistic	10.0	0.0	0.0	0.0	0.0
Real Assets	17.0	7.5	5.1	12.8	0.0
Hedge Funds	7.0	0.0	4.8	0.0	0.0
Private Equity	9.0	11.7	11.7	11.0	0.0
Cash Equivalents	1.0	1.0	1.0	1.0	0.0
Totals	100.00	100.00	100.00	100.00	100.00
Projected Arithmetic Return	8.21%	7.73%	7.74%	7.74%	7.57%
10-year Compound Return	7.36%	7.13%	7.13%	7.13%	6.95%
Projected Standard Deviation	14.79%	12.82%	12.88%	12.86%	12.86%
Equity	55.0%	58.6%	58.9%	55.4%	70.1%
Inv Grade Fixed	10.0%	32.9%	30.2%	30.9%	30.0%
Alts	33.0%	19.2%	21.6%	23.8%	0.0%

Focus on 30-Year Time Horizon – Implementation Alternatives

- Mix 1 is expected to meet the 7.13 nominal/4.88 real return target over a 30 year horizon
- Alternative optimizations for implementing a portfolio similar to Mix 1 are displayed in the table
 - Mix 1 is the “unconstrained” mix that meets the 7.13% nominal target over 30 years
 - Mix 1+HF is the unconstrained mix that includes absolute return (labeled hedge funds) that meets 7.13%
 - The third Mix constrains real assets to a maximum of 13% and private equity to 11% in a mix that meets 7.13%
 - The Public Market Proxy uses only public market asset classes to generate a portfolio with the same risk as the Constrained RE and PE portfolio

30-year projection

	PERS	Mix 1	Mix 1+HF	Constrain RE & PE	Public Market Proxy
Broad US Equity	24.0	26.4	26.6	26.5	39.5
Global ex US Equity	22.0	17.3	17.4	17.3	25.8
Intermediate Treasuries	10.0	0.0	0.0	0.0	0.0
Domestic Fixed	0.0	37.2	34.5	37.2	34.7
Opportunistic	10.0	0.0	0.0	0.0	0.0
Real Assets	17.0	7.1	4.5	7.0	0.0
Hedge Funds	7.0	0.0	5.0	0.0	0.0
Private Equity	9.0	11.0	11.0	11.0	0.0
Cash Equivalents	1.0	1.0	1.0	1.0	0.0
Totals	100.00	100.00	100.00	100.00	100.00
Projected Arithmetic Return	8.35%	7.64%	7.64%	7.64%	7.50%
10-year Compound Return	7.51%	7.13%	7.13%	7.13%	6.98%
Projected Standard Deviation	14.79%	11.97%	12.03%	11.98%	11.98%
Equity	55.0%	54.7%	55.0%	54.8%	65.3%
Inv Grade Fixed	10.0%	37.2%	34.5%	37.2%	34.7%
Alts	33.0%	18.1%	20.5%	18.0%	0.0%

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ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Asset Allocations –
Resolutions 2019-03 and 2019-04
DATE: June 20-21, 2019

ACTION: X
INFORMATION:

BACKGROUND:

The Alaska Retirement Management Board (ARMB) sets and reviews the asset allocations on behalf of all plans over which it has fiduciary responsibility.

STATUS:

On April 29, 2019, Bob Mitchell and Zach Hanna participated in a conference call with Paul Erlendson, Steve Center, and Jay Kloepper of Callan LLC (Callan) and Investment Advisory Council members Dr. William Jennings, Dr. Jerrold Mitchell, and Robert Shaw. The participants reviewed Callan's work to identify potential asset allocation mixes for the ARMB to consider for the upcoming fiscal year.

Based on feedback received from this meeting, and subsequent discussions with Jay Kloepper, Callan presented its recommendations regarding asset allocation mixes at this meeting.

Staff recommend the following strategic asset allocations after considering current asset allocations and a range of optimal portfolios produced by Callan:

Resolution 2019-03

Public Employees' Retirement System Defined Benefit and Defined Contribution Plans
Teachers' Retirement System Defined Benefit and Defined Contribution Plans
Judicial Retirement System Defined Benefit Plans

Resolution 2019-04

Alaska National Guard and Naval Militia Retirement Systems

RECOMMENDATION:

The Alaska Retirement Management Board adopt Resolutions 2019-03 and 2019-04, approving the asset allocations for fiscal year 2020.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Asset Allocation for the Funds of the
Public Employees' Retirement System Defined Benefit and Defined Contribution Plans,
Teachers' Retirement System Defined Benefit and Defined Contribution Plans, and
Judicial Retirement System Defined Benefit Plans

Resolution 2019-03

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee of the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policies for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts with an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has reviewed the actuarial assumptions; and

WHEREAS, the Board has reviewed the asset allocation set forth in the study prepared by the external investment consulting firm of Callan Associates, Inc.; and

WHEREAS, a prudent, diversified portfolio reduces risk and volatility and considers short term and long term earnings requirements for the Funds; and

WHEREAS, the Board shall continue to review, evaluate and make appropriate adjustments to asset allocation for the retirement plans on a periodic basis;

NOW THEREFORE, BE IT RESOLVED BY THE ALASKA RETIREMENT MANAGEMENT BOARD that effective July 1, 2019, the following asset allocation be established for the following funds:

(1) Public Employees' Retirement System

- Defined Benefit Plans
 - Retirement Trust
 - Retirement Health Care Trust
- Defined Contribution Plans
 - Health Reimbursement Arrangement Plan Trust Fund
 - Retiree Medical Plan
 - Defined Benefit Occupational Death and Disability

- Public Employees All Other
- Peace Officers and Firefighters

(2) Teachers' Retirement System

- Defined Benefit Plans
 - Retirement Trust
 - Retirement Health Care Trust
- Defined Contribution Plans
 - Health Reimbursement Arrangement Plan Trust Fund
 - Retiree Medical Plan
 - Defined Benefit Occupational Death and Disability

(3) Judicial Retirement System

- Retirement Trust
- Retirement Health Care Trust

Target Asset Allocation

<u>Asset Class</u>	<u>Allocation</u>	<u>Range</u>
Broad Domestic Equity	26%	± 6%
Global Equity Ex-US	18%	± 4%
Fixed Income	24%	± 6%
Opportunistic	8%	± 4%
Real Assets	13%	± 7%
<u>Private Equity</u>	<u>11%</u>	± 6%
Total	100%	

Expected Return – 20 Year Geometric Mean 7.1%

Projected Standard Deviation 13.8%

Policy Benchmarks

<u>Asset Class</u>	<u>Benchmark</u>
Broad Domestic Equity	Russell 3000
Global Equity Ex-US	MSCI ACWI Ex-US IMI Net
Fixed Income	95% BB US Aggregate 5% 3-Month Treasury Bill
Opportunistic	60% Russell 1000 40% BB US Aggregate
Real Assets	45.5% NCREIF Total 25% NCREIF Farmland 10% NCREIF Timberland 17.5% Global Infrastructure 2% FTSE NAREIT All Equity
Private Equity	1/3 S&P 500 1/3 Russell 2000 1/3 MSCI EAFE Net

Public Market Proxy Portfolio

Total Fund Proxy Expectations:	45% Russell 3000
20 Year Geometric Return: 6.9%	30% MSCI ACWI Ex-US IMI Net
Standard Deviation: 13.8%	25% BB US Aggregate

This resolution repeals and replaces Resolution 2017-03.

DATED at Juneau, Alaska this ____ day of June, 2019.

Chair

ATTEST:

Secretary

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Asset Allocation
For the Alaska National Guard and Naval Militia Retirement Systems

Resolution 2019-04

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee of the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts with an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has reviewed the actuarial assumptions for the Alaska National Guard and Naval Militia Retirement Systems; and

WHEREAS, the Board has reviewed the asset allocation set forth in the study prepared by the external investment consulting firm of Callan Associates, Inc.; and

WHEREAS, a prudent, diversified portfolio reduces risk and volatility and considers short term and long term earnings requirements for the Funds; and

WHEREAS, the Board shall continue to review, evaluate and make appropriate adjustments to asset allocation for the retirement plans on a periodic basis;

NOW THEREFORE, BE IT RESOLVED BY THE ALASKA RETIREMENT MANAGEMENT BOARD that the following asset allocation be established for the Alaska National Guard & Naval Militia Retirement System, effective July 1, 2019:

Target Asset Allocation

<u>Asset Class</u>	<u>Allocation</u>	<u>Range</u>
Broad Domestic Equity	26%	± 6%
Global Equity Ex-US	21%	± 4%
Fixed Income	45%	± 10%
Opportunistic	8%	± 5%
<u>Cash Equivalents</u>	<u>0%</u>	+ 3%
Total	100%	
Expected Return – 20 Year Geometric Mean	6.1%	
Projected Standard Deviation	9.5%	

Policy Benchmarks

<u>Asset Class</u>	<u>Benchmark</u>
Broad Domestic Equity	Russell 3000
Global Equity Ex-US	MSCI ACWI Ex-US IMI Net
Fixed Income	BB US Aggregate
Opportunistic	60% Russell 1000 40% BB US Aggregate
Cash Equivalents	3-Month Treasury Bill

This resolution repeals and replaces Resolution 2018-02.

DATED at Juneau, Alaska this ____ day of June, 2019.

Chair

ATTEST:

Secretary

ALASKA RETIREMENT MANAGEMENT BOARD

Manager Structure

Bob Mitchell, CFA
Chief Investment Officer
June 20-21, 2019

Key Board Decisions

Determine Investment Objective

- Fund's Purpose
- Governance – who makes which decisions?

Determine Asset Allocation

- Strategic
- Tactical

Oversee Implementation

- Manager Structure – number and types of manager allocations.
- Manager Selection

Monitor Results

- Are the fund, asset classes and mandates performing as expected?
- Are they achieving objectives?

Manager Structure Review Schedule

June

- Absolute Return
- Opportunistic
- Fixed Income/Cash
- Domestic Equities

September

- Real Assets
- International Equities

December

- Private Equity

Absolute Return

Recommended Absolute Return Roster Changes

Strategy	Destination		
	Fixed Income	Opportunistic	Terminate
Crestline Strategies	X		
JP Morgan Systematic Alpha		X	
Man Group Alternative Risk Premia		X	
Prisma Capital Partners (Polar Bear)			X
Zebra Global Equity Advantage Fund			X
Zebra Global Equity Fund			X

Prisma strategies will be moved to Fixed Income and Zebra strategies will be moved to Opportunistic, pending liquidation.

Opportunistic

Role of Opportunistic Asset Class

- Current Purpose = contains securities and strategies with performance characteristics similar to a blend of stocks and bonds.
- Given limited size of fixed income allocation, the fixed income allocation is currently focused on holding only U.S. Treasury securities.
- Opportunistic contains other fixed income mandates. With increased allocation to fixed income, recommend repatriating these strategies into fixed income.
- Purpose Going Forward = outperform the benchmark using sources of return not readily available in other asset classes.
- Examples include: tactical asset allocation, and multi-asset class factor-based mandates, thematic, risk parity, and strategies that do not fit well in other asset classes.

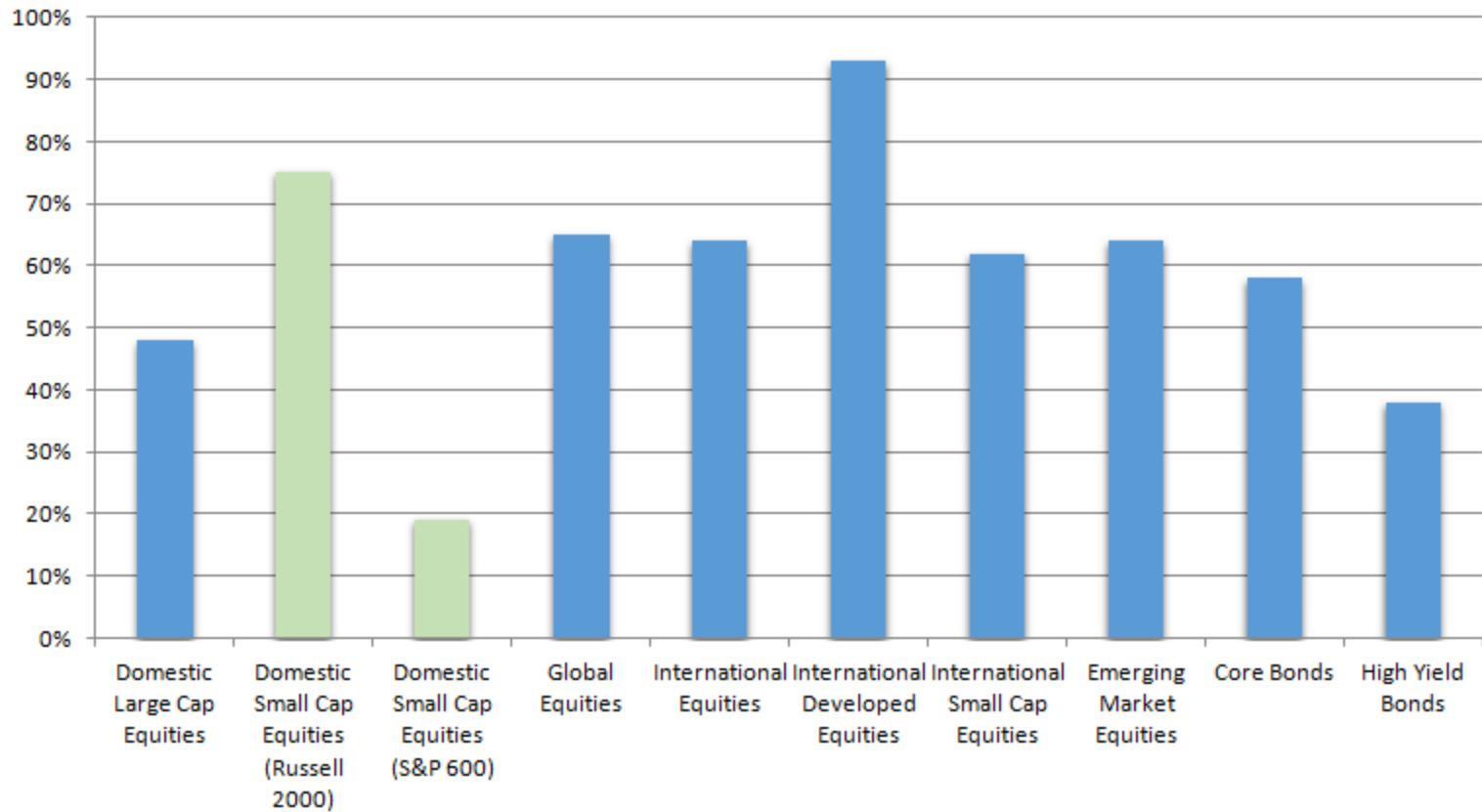
Recommended Opportunistic Roster Changes

Strategy	Destination		
	Opportunistic	Fixed Income	Terminate
Analytic Buy-Write			X
ARMB STOXX 900 USA Min Var			X
Fidelity Signals	X		
PineBridge	X		
McKinley Global Health Care	X		
Project Pearl	X		
Fidelity Real Estate High Income		X	
Fidelity Tactical Bond		X	
MacKay Shields, LLC			X
Mondrian Investment Partners, Inc.			X
Western Asset Management Co			X

MacKay Shields, Mondrian and Western Asset Management strategies will be moved to Fixed Income pending liquidation.

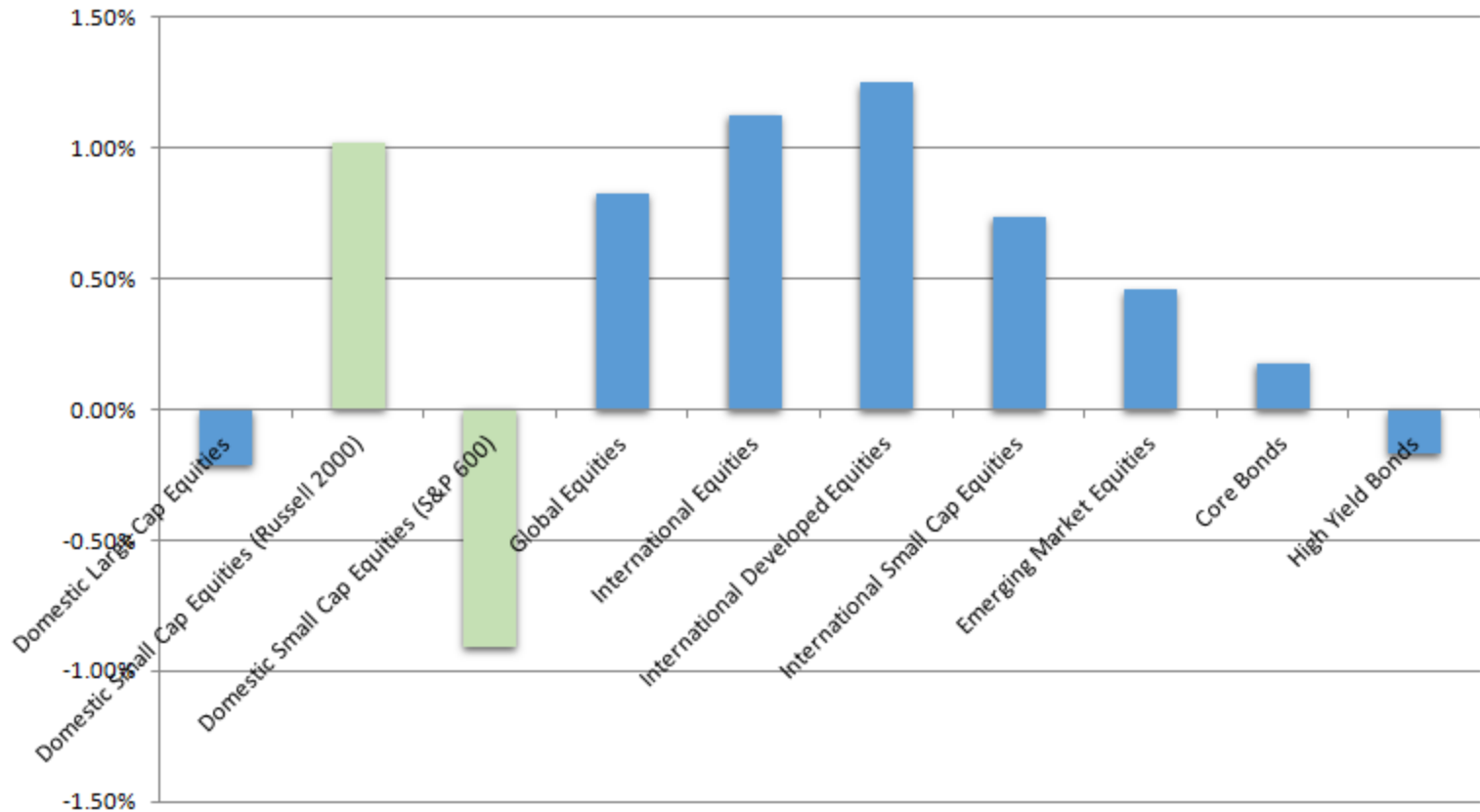
Equities

Percentage that Outperform Net of Fees



Average rolling 3-year median performance over 20 years ending 12/31/2018, less average fees paid. Sources: *Active vs. Passive Report: Fourth Quarter 2018* and *2017 Investment Management Fee Survey*, both from Callan.

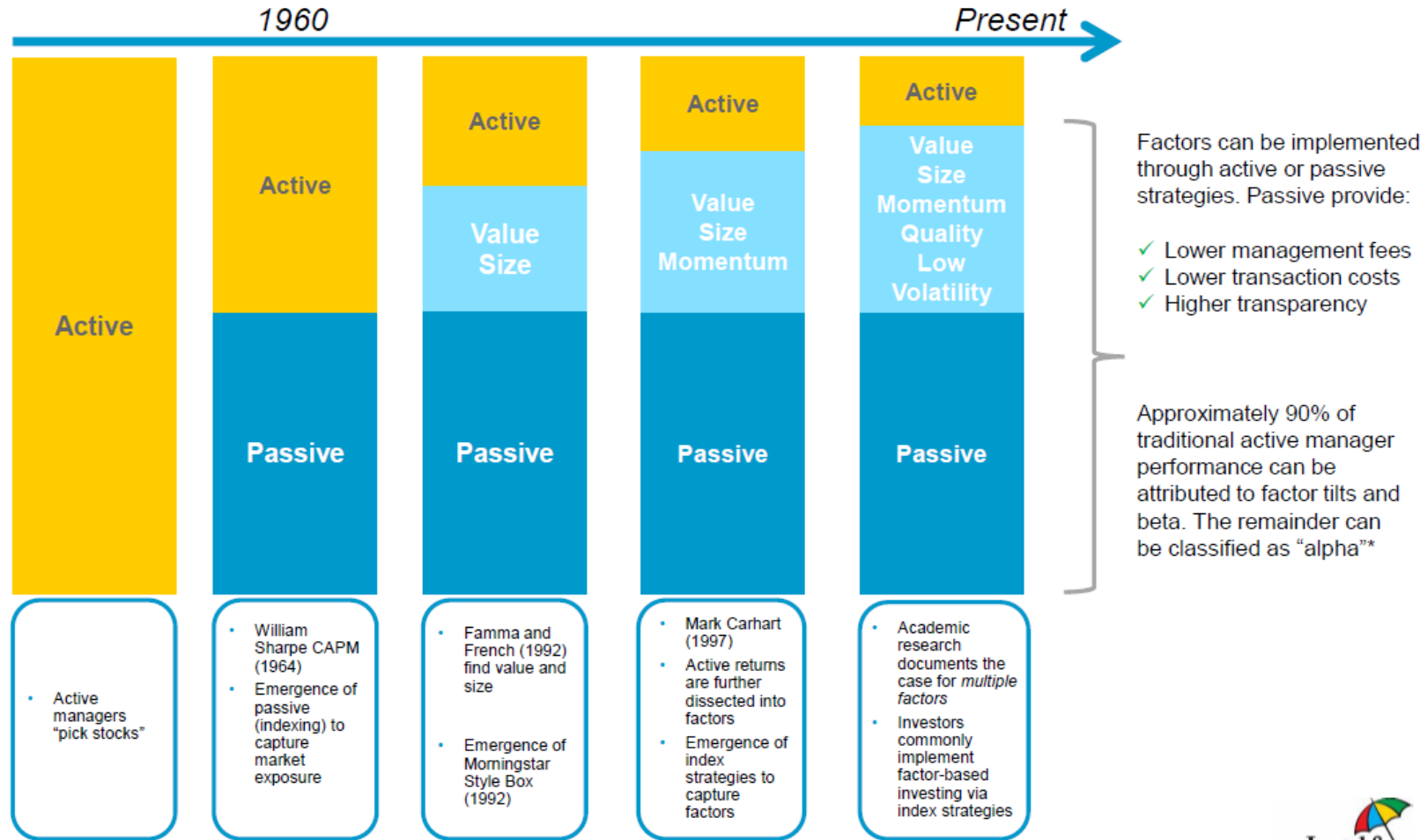
Average Outperformance Net of Fees



Average rolling 3-year median performance over 20 years ending 12/31/2018, less average fees paid. Sources: *Active vs. Passive Report: Fourth Quarter 2018* and *2017 Investment Management Fee Survey*, both from Callan.

The Next Hurdle: Factor-Based Compensation

History of factors



4

*Source: LGIMA, Bloomberg, Morningstar, Kenneth French Data Library, Scientific Beta. Data as of December 31, 2018 using monthly returns over 15-year period. Factor returns inclusive of market, size, value, momentum and quality based off of Fama, French, Carhart methodology. Study refers to the average monthly performance of the top quartile of active large cap US equity mutual funds over a 15-year period. Chart depicted above are intended for illustrative purposes only

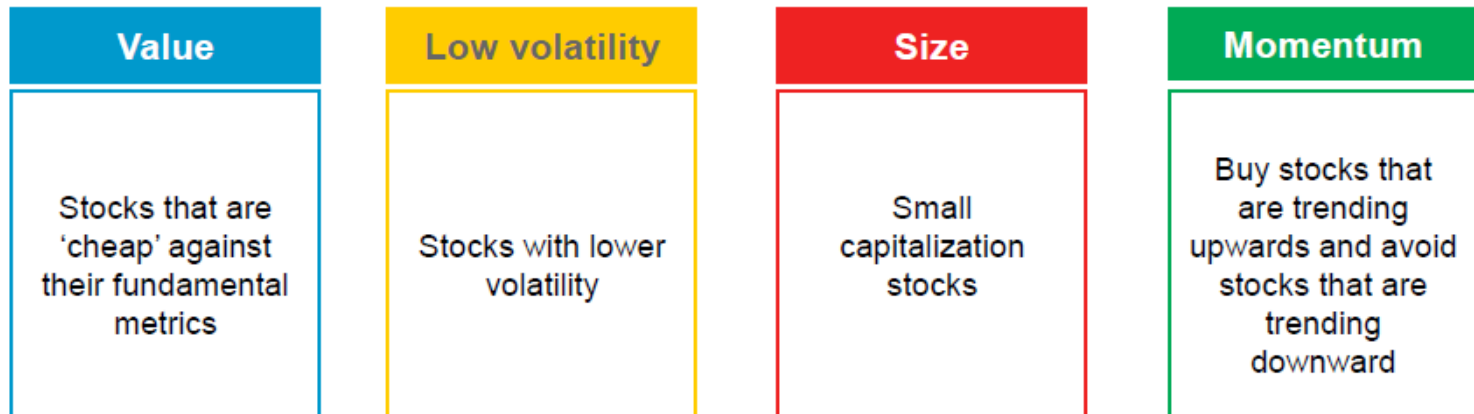


The Next Hurdle: Factor-Based Compensation

What is a factor?

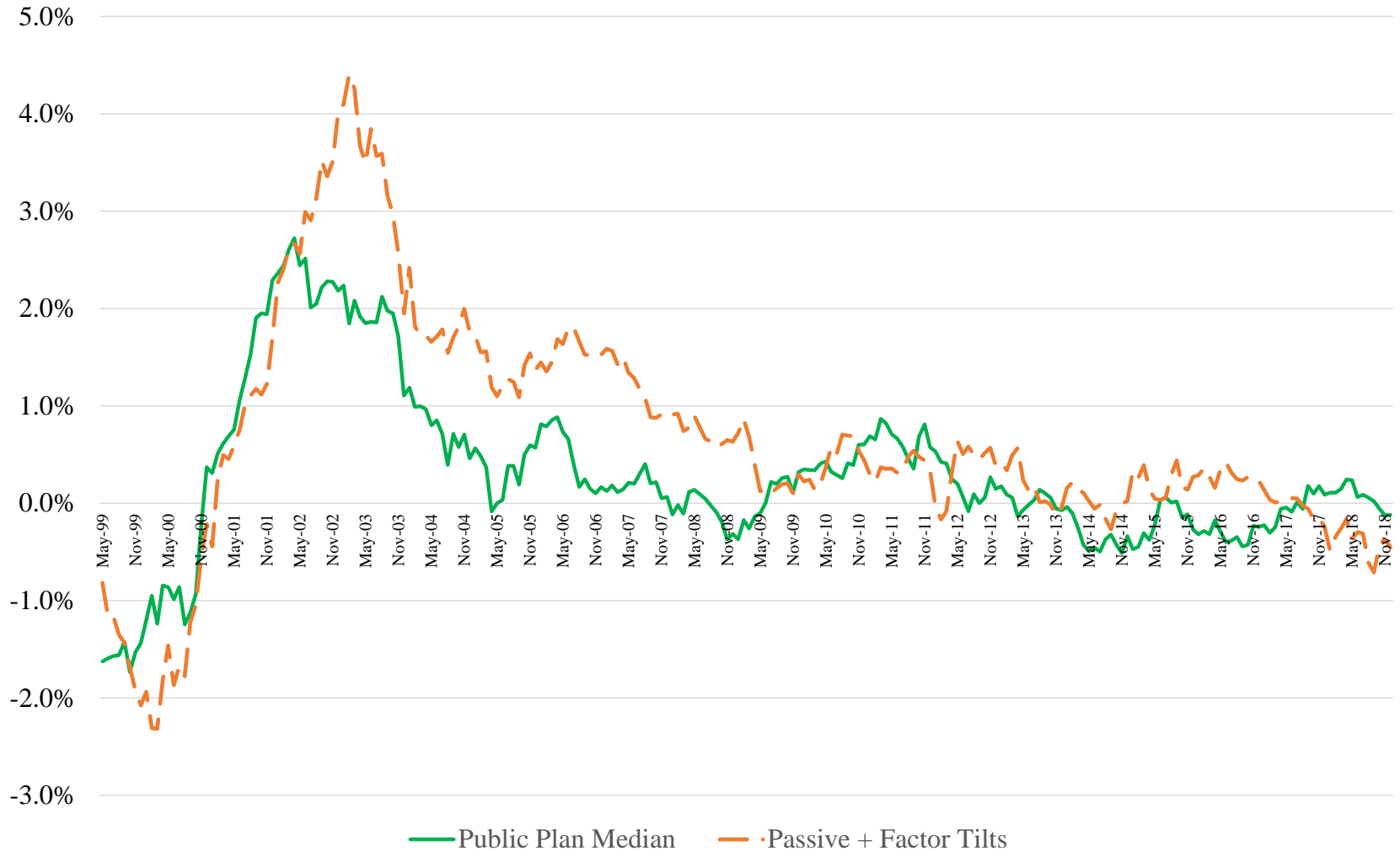
A fundamental question of finance - What drives a portfolio's returns?

- Academics began questioning if expected return was only driven by one factor (market exposure) or if there were other sources of risk that could explain a stock's returns
- They found that there were other sources of risk (i.e. factors) for which investors are compensated
- These factors are economically grounded and have historically earned a higher risk adjusted return than market-cap based strategies



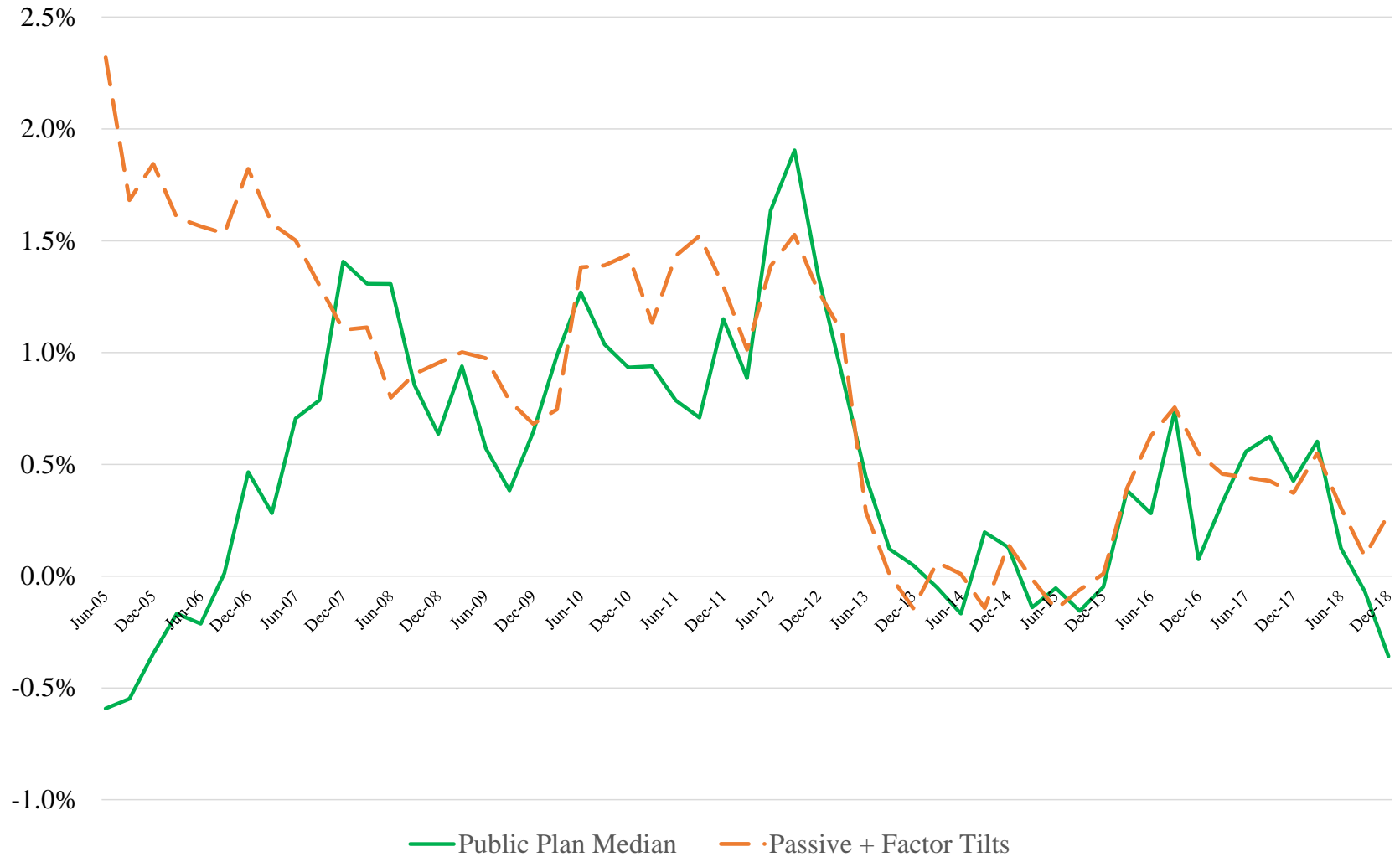
Domestic Equity – Relative Passive/Factor vs. Peers

Rolling 3-Year Returns



International Equity – Relative Passive/Factor vs. Peers

Rolling 3-Year Returns



Domestic Equities

Domestic Equity Recommendations

Recommendation # 1: Employ S&P 1500 Index components for domestic equity investment.

S&P 1500 vs Russell 3000 – Index Construction

Inclusion Criteria	S&P 1500	Russell 3000
Earnings Criterion	1) Positive sum of trailing four consecutive quarters' earnings 2) Positive most recent quarter's earnings	None
Liquidity Criterion	1) Annual dollar value traded to float-adjusted market capitalization of at least 1.00 2) Minimum of 250,000 shares in each of the six months	Average daily dollar trading value must exceed that of the global median
Public Float Criterion	At least 50% of shares publicly floated	At least 5% of shares publicly floated
Market Capitalization Criterion	S&P 500: at least US\$ 8.2 billion S&P MidCap 400: US\$ 2.4 billion to US\$ 8.2 billion S&P SmallCap 600: US\$ 600 million to US\$ 2.4 billion.	Companies ranked #1–3,000 Minimum total market capitalization \$30 million
Domicile of Constituents	U.S. Companies, based on multiple criteria such as exchange listing, assets by location, revenues, etc.	U.S. Companies, based on multiple criteria such as exchange listing, assets by location, revenues, etc.
IPO Seasoning	IPOs must be traded for at least 12 months before being considered for addition	None

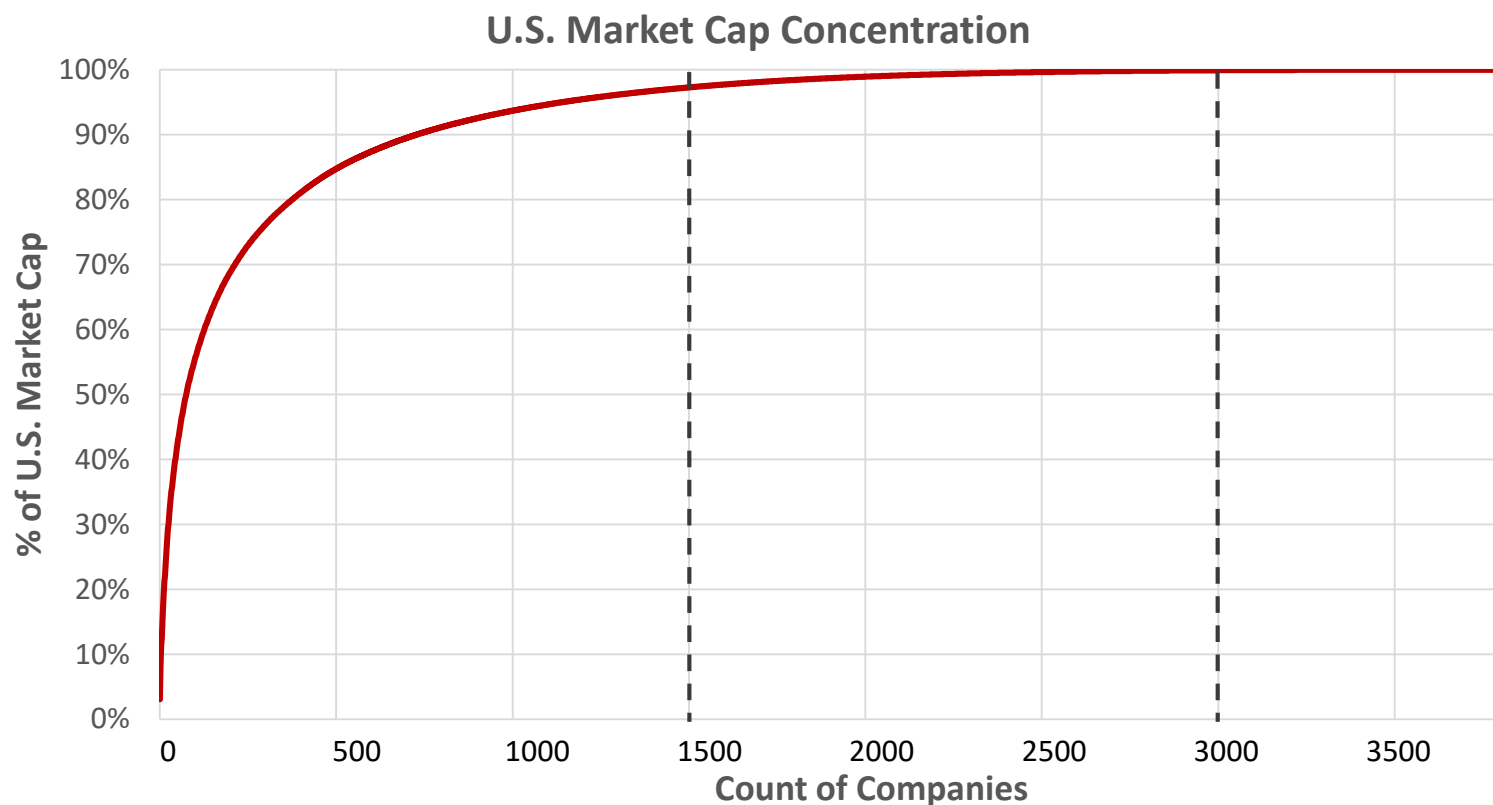
Source: S&P Dow Jones Indices LLC, FTSE Russell.

**S&P Dow Jones
Indices**

An S&P Global Division

U.S. Stock Market - Concentrated at the Top

*Approximately **97%** of U.S. equity market cap can be covered with as few as 1500 stocks. Additional companies provide little incremental coverage, reduce index efficiency, and force optimization.*

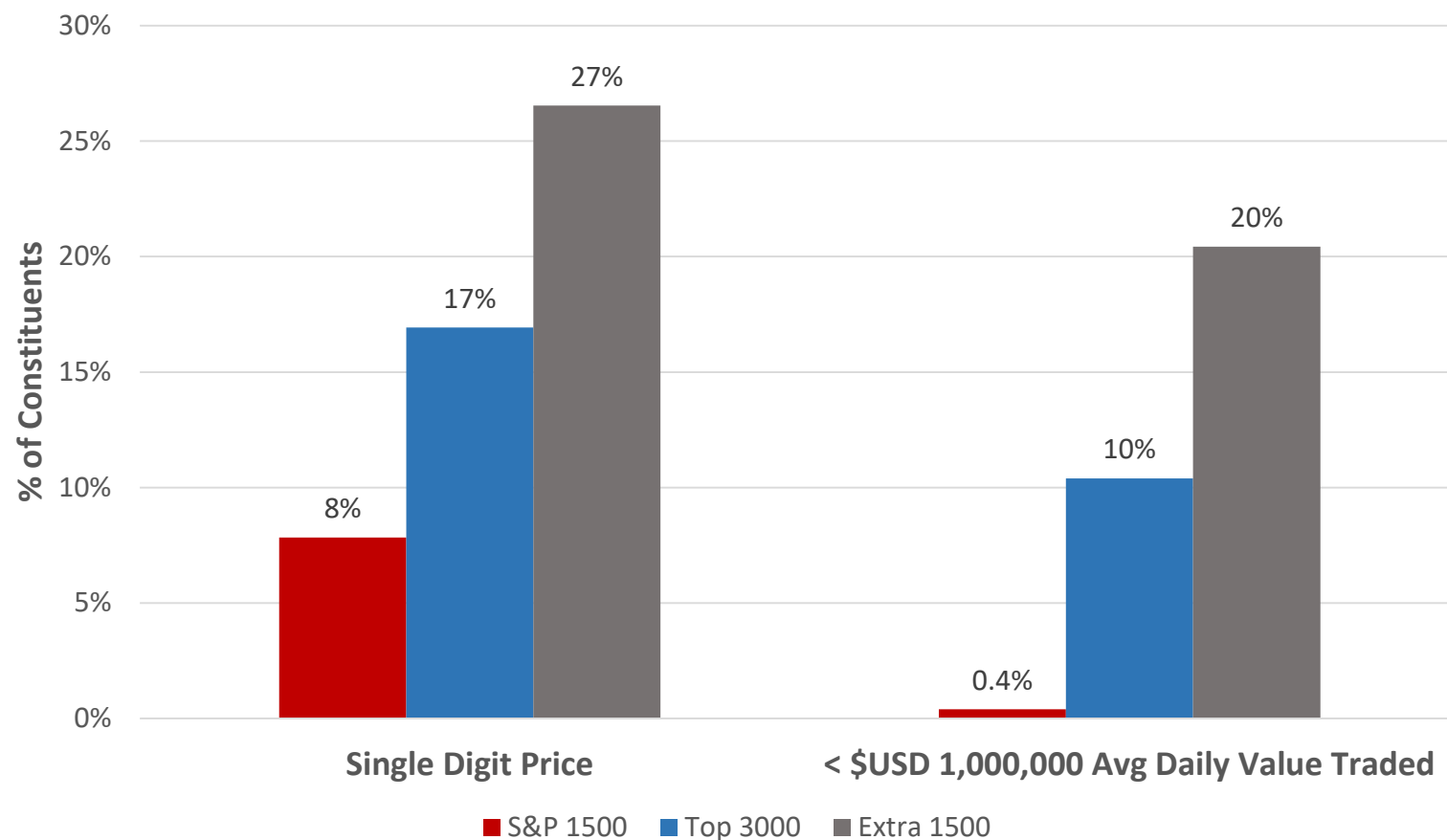


Source: S&P Dow Jones Indices LLC. Data as of Dec. 31, 2018

**S&P Dow Jones
Indices**

An S&P Global Division

Russell “Extra 1500” - Low Priced & Illiquid



Source: S&P Dow Jones Indices LLC. Data as of Dec. 31, 2018

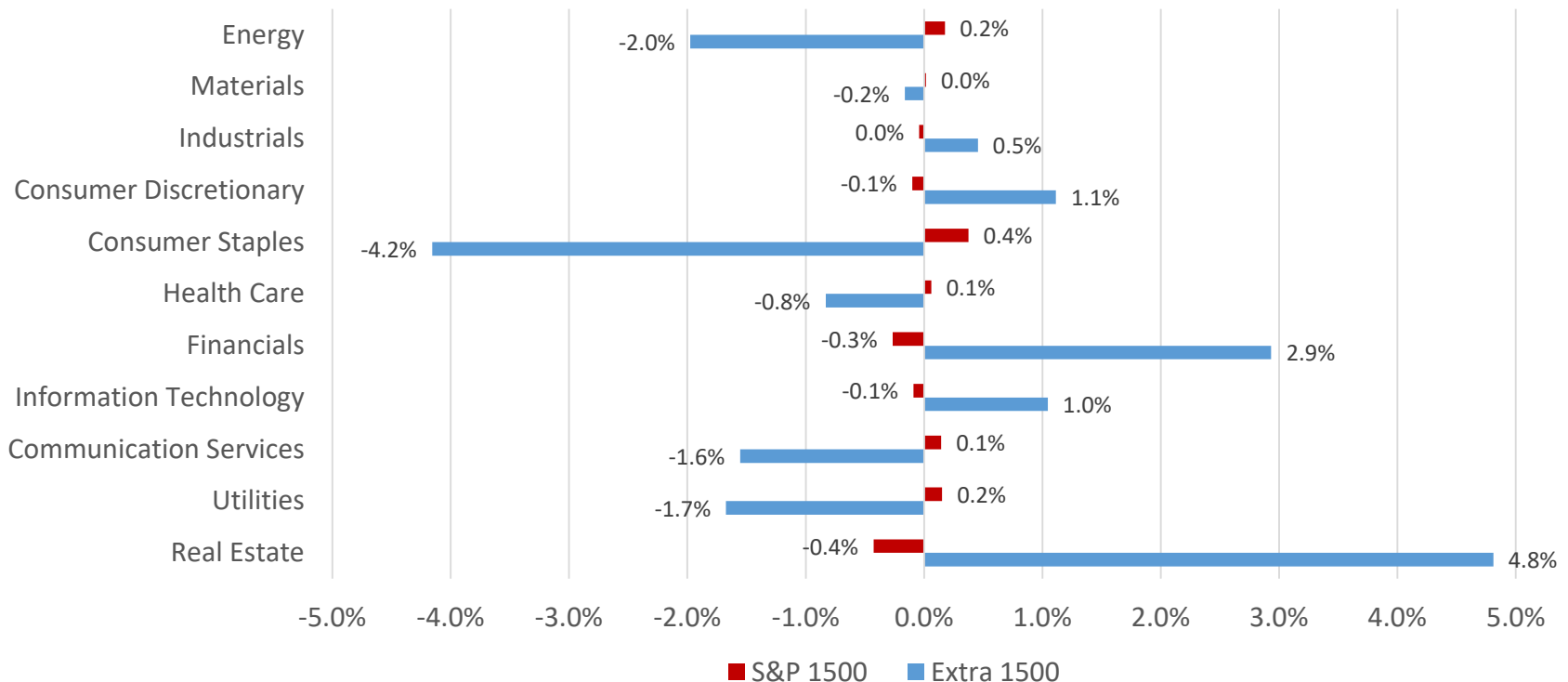
**S&P Dow Jones
Indices**

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“Extra 1500” - Sector Composition Unlike Market

Sector balance is considered in the selection of companies for the S&P U.S. indices. The “Extra 1500” are distortive of the U.S. equity universe composition.

Sector Representations by Market Cap Relative to the U.S. Universe



Source: S&P Dow Jones Indices LLC. Data as of Dec. 31, 2018

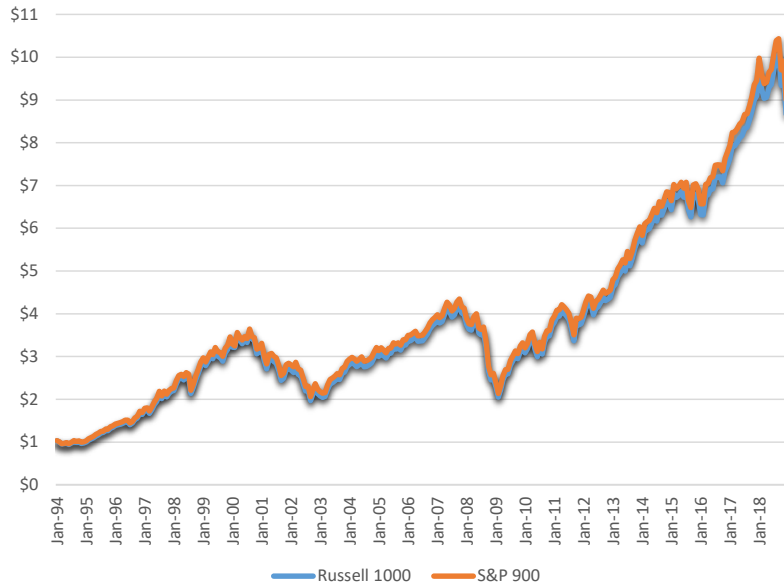
**S&P Dow Jones
Indices**

An S&P Global Division

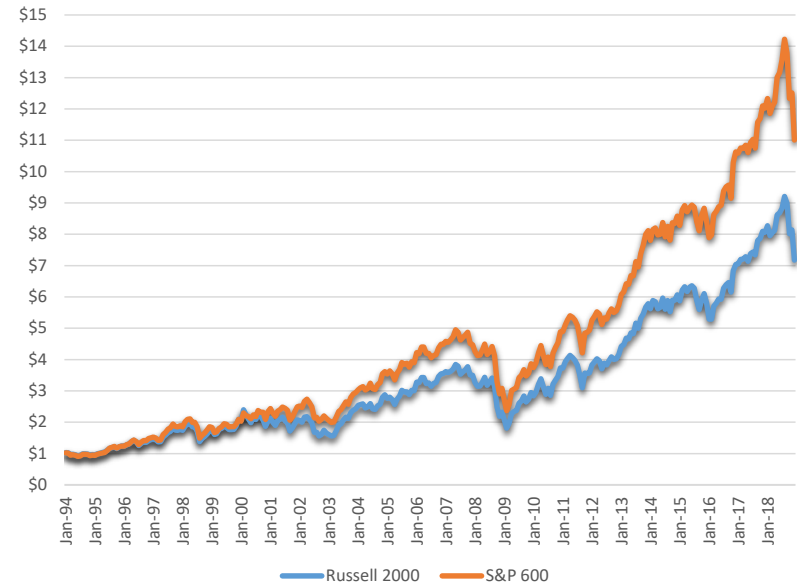
Growth of a Dollar

(Jan. 1994 – Dec. 2018)

S&P 900 vs. Russell 1000



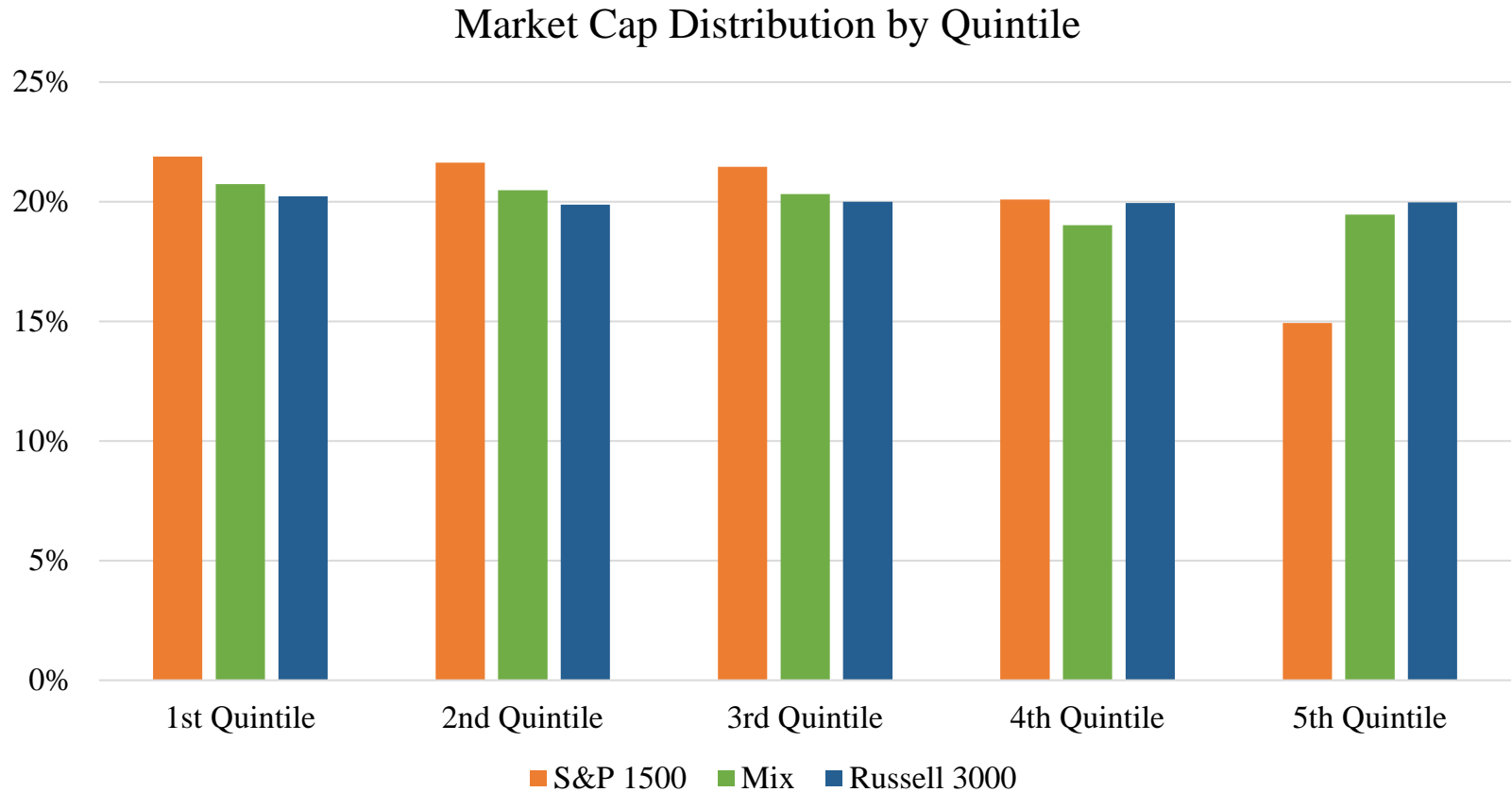
S&P 600 vs. Russell 2000



- Earnings requirement improves the quality of the S&P 1500. Quality appears to be a statistically significant explanatory factor in the outperformance of the S&P 600 relative to the Russell 2000.*
- A dollar grows to \$8.66 and \$9, respectively for the Russell 1000 and the S&P 900. For the Russell 2000 and the S&P 600, a dollar grows to \$7.17 and \$11.

* A Tale of Two Benchmarks: Five Years Later, S&P Dow Jones Indices, pages 9-10

Market Cap Distribution



“Mix” is comprised of 92% large cap (70% S&P 900, 30% Scientific Beta Multi-Beta Multi-Factor), and 8% to small cap (S&P 600). The large cap and small cap weights correspond more closely with those of the Russell 3000.

Domestic Equity Recommendations

Recommendation # 2: Consolidate domestic equity strategies.

Callan's 4Q 2018 Active vs. Passive Report

Small Cap Equity Style vs. Russell 2000

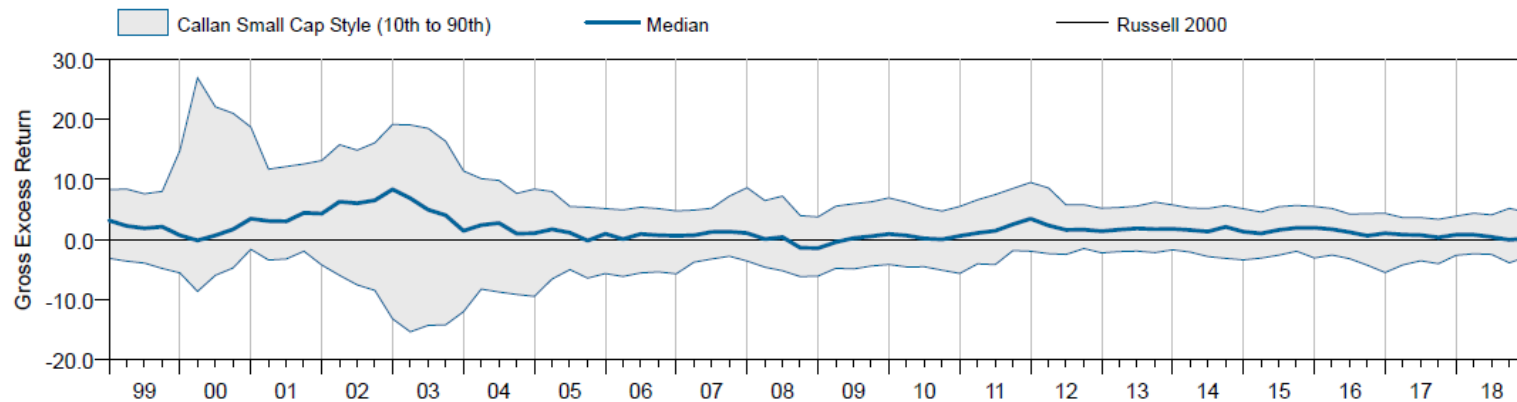
How often Manager Beat Benchmark by more than Fee Hurdle in Rolling 3-Year Periods over last 20 Years

Fee Hurdle	0.50%	0.55%	0.60%	0.65%	0.70%	0.75%	0.80%	0.85%	0.90%	0.95%
Median	81%	80%	80%	75%	73%	69%	65%	65%	65%	63%
45th Percentile	91%	90%	90%	88%	86%	84%	84%	84%	84%	81%
40th Percentile	98%	98%	98%	98%	98%	98%	95%	90%	88%	88%
35th Percentile	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
30th Percentile	99%	98%	98%	98%	98%	98%	98%	98%	98%	98%
25th Percentile	100%	100%	100%	100%	100%	99%	99%	99%	99%	99%

Average Annualized 3-Year Excess Return (gross) – Median Manager:

1.67%

Rolling 3-Year Gross Excess Return relative to Russell 2000
for 20 Years ended December 31, 2018



Callan's 4Q 2018 Active vs. Passive Report

Small Cap Equity Style vs. S&P SmallCap 600

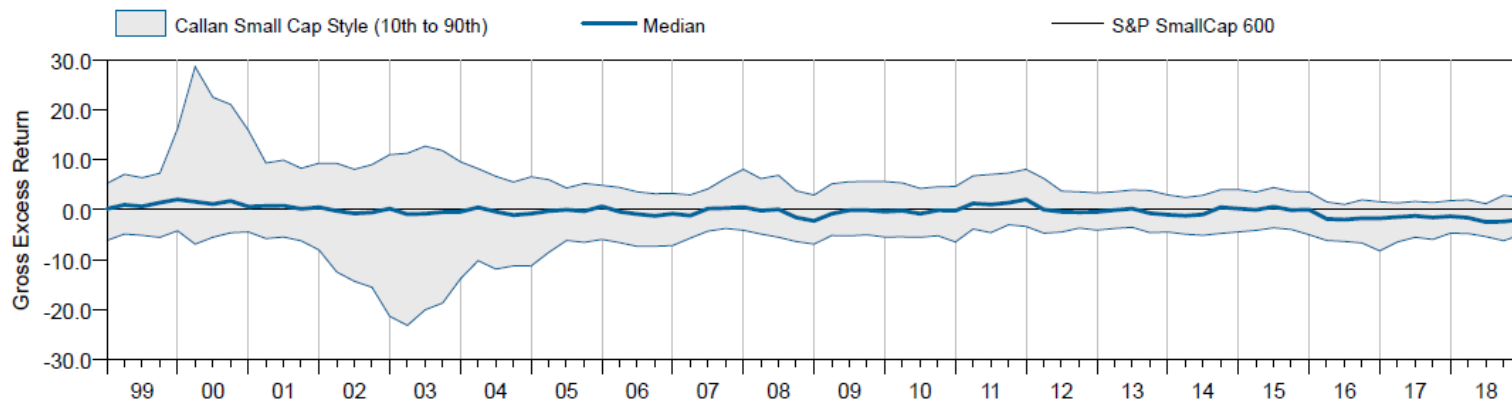
How often Manager Beat Benchmark by more than Fee Hurdle in Rolling 3-Year Periods over last 20 Years

Fee Hurdle	0.50%	0.55%	0.60%	0.65%	0.70%	0.75%	0.80%	0.85%	0.90%	0.95%
Median	24%	20%	20%	19%	16%	15%	14%	13%	13%	13%
45th Percentile	43%	39%	39%	36%	36%	34%	33%	31%	30%	28%
40th Percentile	63%	60%	59%	58%	56%	55%	53%	50%	50%	46%
35th Percentile	73%	71%	71%	71%	70%	69%	68%	66%	65%	63%
30th Percentile	81%	80%	80%	80%	79%	79%	79%	78%	76%	76%
25th Percentile	84%	84%	84%	84%	84%	84%	83%	83%	81%	80%

Average Annualized 3-Year Excess Return (gross) – Median Manager:

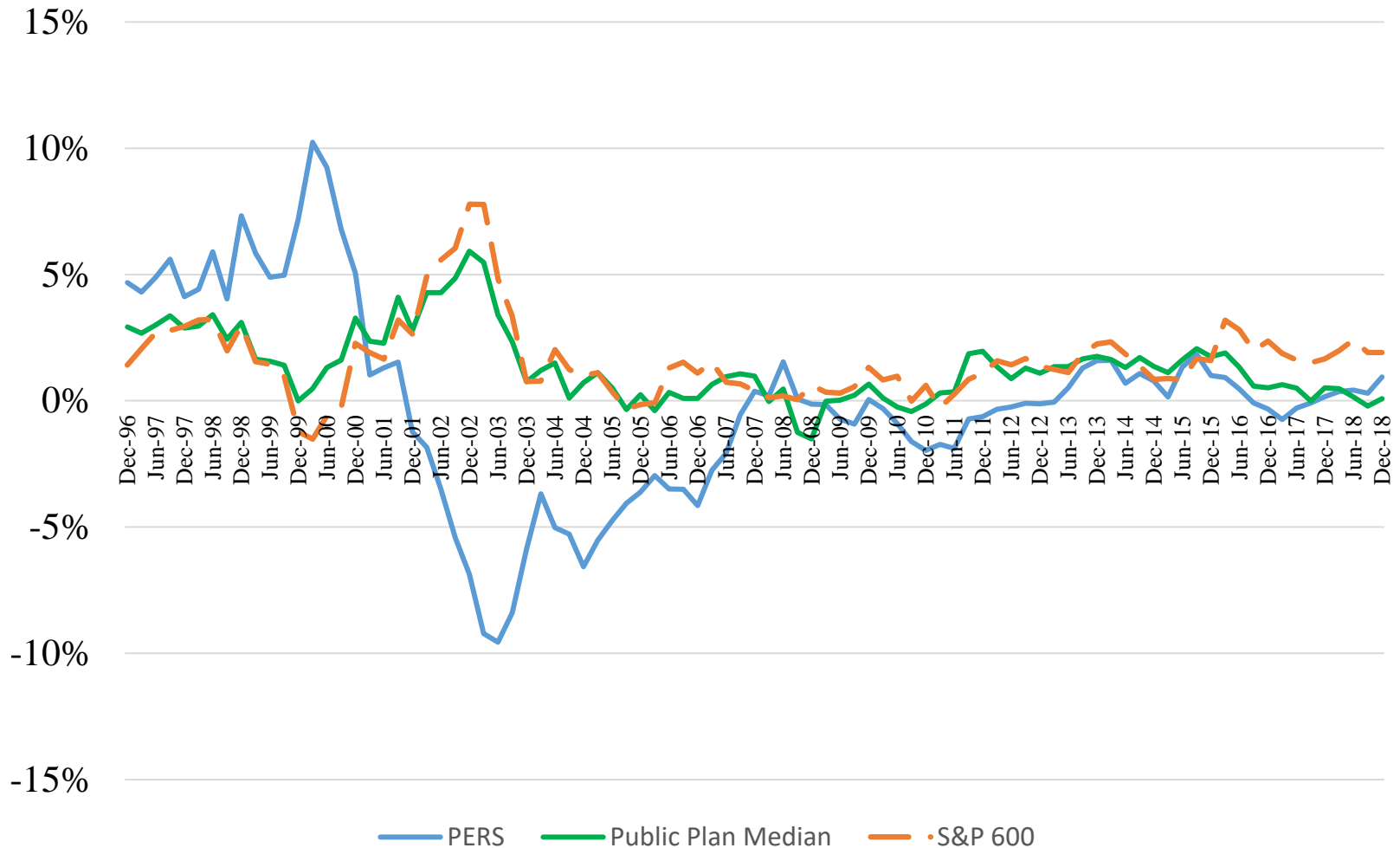
-0.26%

Rolling 3-Year Gross Excess Return relative to S&P SmallCap 600
for 20 Years ended December 31, 2018



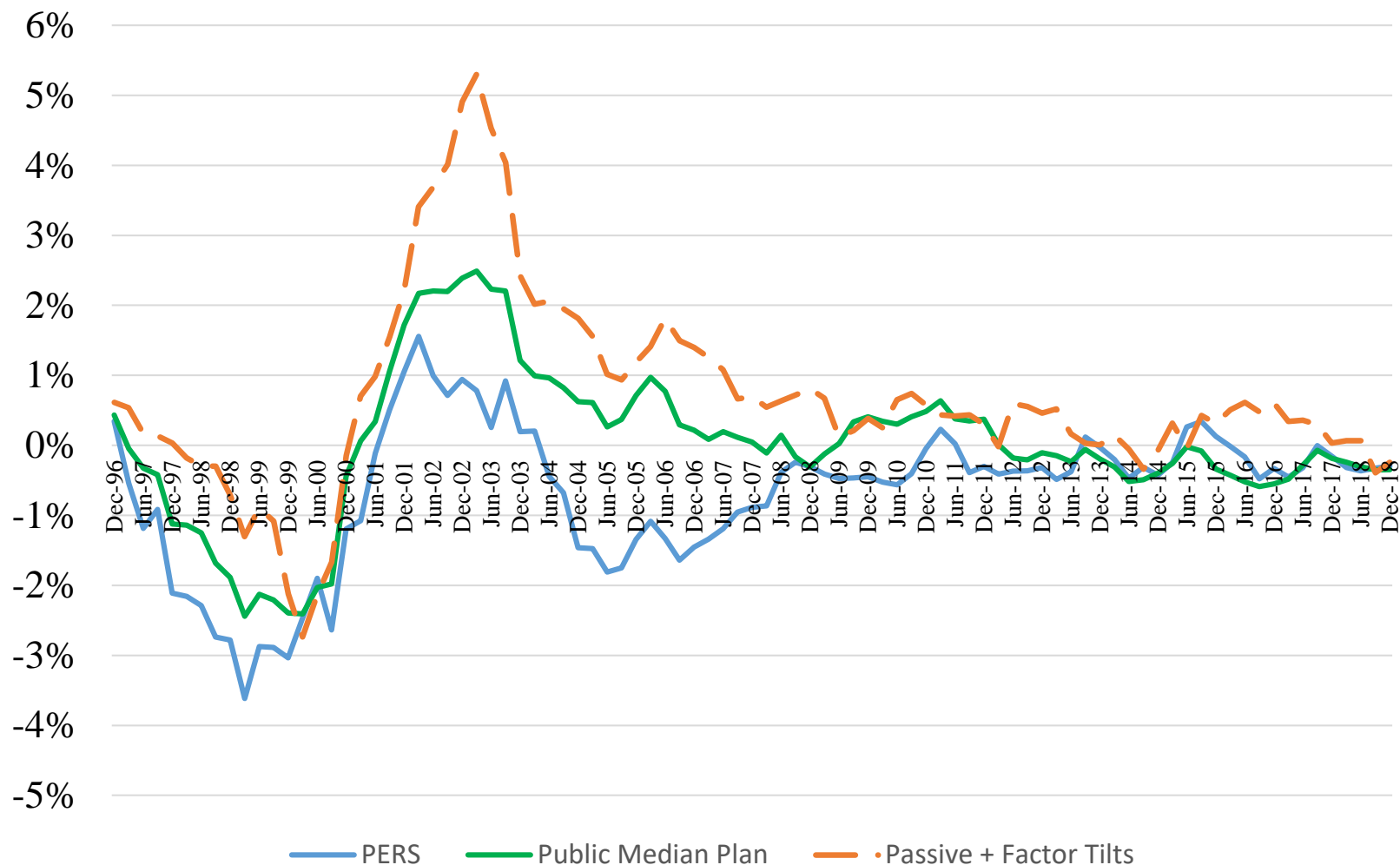
Small Cap Performance Comparison

Rolling 3-Year Relative Returns



Domestic Equity Performance Comparison

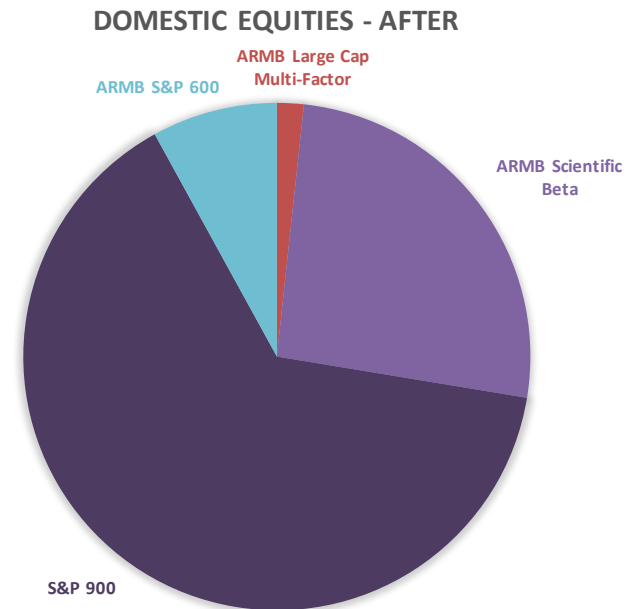
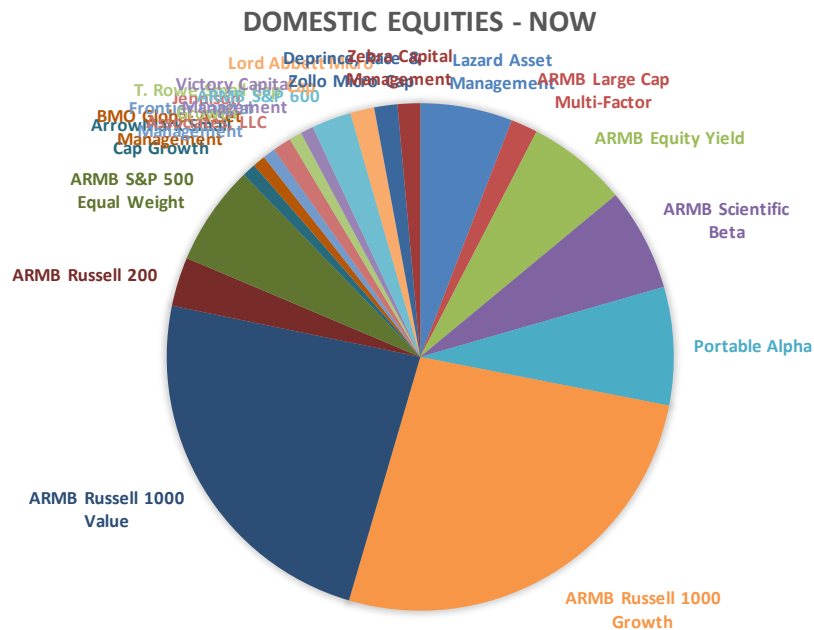
Rolling 3-Year Relative Returns



Recommended Domestic Equity Roster Changes

Strategy	Destination		
	Retain	Add	Terminate
ARMB Equity Yield			X
ARMB Russell 1000 Growth			X
ARMB Russell 1000 Value			X
ARMB Russell 200			X
ARMB S&P 500 Equal Weight			X
Portable Alpha			X
S&P 900		X	
ARMB Scientific Beta	X		
ARMB Large Cap Multi-Factor	X		
ArrowMark Small Cap Growth			X
BMO Global Asset Management			X
Deprince, Race & Zollo Micro Cap			X
Frontier Capital Management			X
Jennison Associates, LLC			X
Lord Abbett Micro Cap			X
T. Rowe Small Cap Growth			X
Victory Capital Management			X
Zebra Capital Management			X
ARMB S&P 600	X		
Futures Large Cap	X		
Futures Small Cap	X		

Recommended Domestic Equity Roster Changes



AllianzGI China A- Shares

June 21, 2019

Anthony Wong, CFA / Portfolio Manager, China A-Shares
Christian McCormick, CFA / Senior Product Specialist
Amanda Montgomery / Senior Relationship Manager



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Global Investors

Your presenters today

Business Development



**Amanada
Montgomery**
Senior
Relationship
Manager

Investment Team



Anthony Wong, CFA
Portfolio Manager
China A-Shares



**Christian
McCormick, CFA**
Senior Product
Specialist

What we aim to deliver to you:



Performance

- Consistent outperformance over market cycle, driven by stock selection
- Well-managed risk profile through disciplined portfolio construction
- Downside capture track record



Portfolio

- Diversified exposure to the China economic and market opportunities
- Close to benchmark sector allocation; High level of active share
- Benchmarked against MSCI China A-Shares Onshore Index



Advantages of Research and Experience

- Experienced management team with 39 years of experience
- Proprietary research capability
- Grassroots® Research – boots on the ground, local insights

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AllianzGI China A-Shares

- Investment philosophy & process
- Portfolio positioning & performance

04

Summary

01

AllianzGI Asia Pacific Overview



Broad and well diversified active investment manager

Assets under management: USD 601 billion

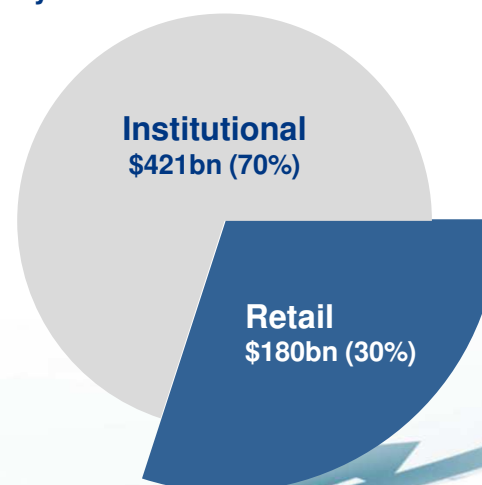
Equities USD 149bn (25%)

Fixed income* USD 210bn (35%)

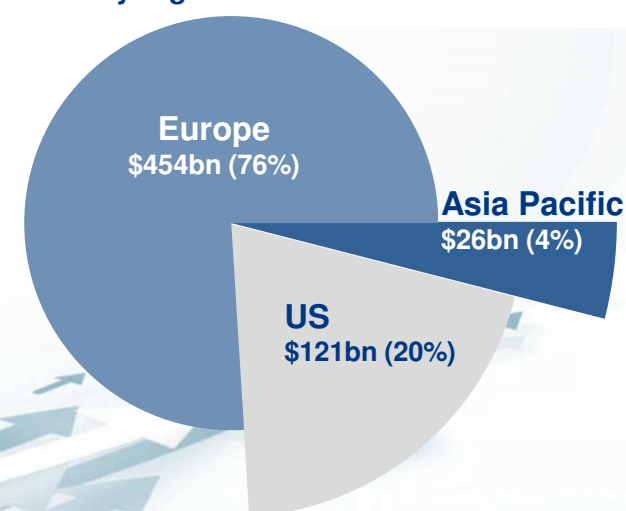
Multi-asset USD 159bn (26%)

Alternatives USD 83bn (14%)

By retail/institutional business



By region**



ES&G* factors are important investment performance drivers**

Active is: Protecting and enhancing our clients' assets



**Comprehensive
investment expertise and insights**

Culture of risk management

Focused on active management

Strong presence built over 31 years¹ in Asia Pacific

- 5 offices
- Number of investment professionals: 117
- AUM of USD 24 bn



Grassroots® Research

A DIVISION OF ALLIANZ GLOBAL INVESTORS

Grassroots® Research network¹

25 reporters and 125 field investigators in APAC

Approximately 100 Asian studies a year

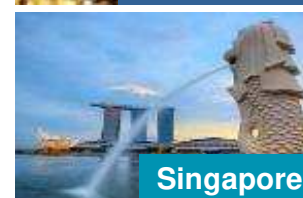
Providing unique market insight



Hong Kong

No. of IP: 55

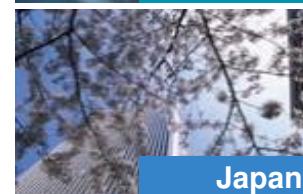
- Regional & single country equities
- Balanced / Multi Asset strategies
- RMB fixed income



Singapore

No. of IP: 16

- Asia fixed income
- Asia Pacific REITs



Japan

No. of IP: 13

- Japan equities
- Multi Asset



Taiwan

No. of IP: 31

- Local equities
- Fund of Funds



Shanghai

No. of IP: 2

- Local multi asset

Source: Allianz Global Investors, as of December 31, 2018. # Grassroots® Research is a division of Allianz Global Investors that commissions investigative market research for asset-management professionals. Research data used to generate Grassroots® Research reports are received from independent, third-party contractors who supply research that, subject to applicable laws and regulations, may be paid for by commissions generated by trades executed on behalf of clients. ¹ Through predecessor companies.

10 years managing dedicated China A-Shares strategy

China equity investment strategies

	Hong Kong Equity	China Equity	Greater China Equity	China A-Shares Equity	All China Equity
Strategy asset size	USD 1.6 billion	USD 1.4 billion	USD 207 million	USD 882 million*	USD 201 million
Inception date	1985	1992	2009	2009	2017
Portfolio manager	Christina Chung	Christina Chung	Christina Chung	Anthony Wong & Sunny Chung	Anthony Wong & Sunny Chung
Investment universe	Typically offshore – HK	Typically offshore – HK and US	Typically offshore – HK, Taiwan, US	Shanghai and Shenzhen only	Onshore and offshore exposures
Typical benchmark	Hang Seng Index	MSCI China	MSCI Golden Dragon	MSCI China A Onshore	MSCI All China

Experienced team based in Hong Kong Supported by global resources

Greater China Equity Portfolio Managers

	Christina Chung, CFA – Greater China Team Head Portfolio Manager – Offshore HK / China / GC 30 years experience, 21 years with the firm
	Sunny Chung Portfolio Manager – China A / All China 21 years experience, 13 years with the firm
	Anthony Wong, CFA Portfolio Manager – China A / All China 17 years experience, 7 years with the firm
	Belvis Wong, CFA Portfolio Analyst 7 years experience, 4 years with the firm

Research Analysts

China analysts		Regional analysts	
	Kevin You (12) Research Analyst China Industrials		Terence Law, CFA (23) Head of Research, AP Financials/ Property
	Catherine Chan(12) Research Analyst China Energy & Materials		Karen Chan, CFA (22) Research Analyst Industrials / Transport
	Sophia Zhang (11) Research Analyst China Consumers		Jason Hsu (11) Research Analyst Technology
	Terry Chen, CFA (9) Research Analyst China Internet / Telecom		Jasmine To (8) Research Analyst Mid/ Small Cap
	Marco Yau (6) Research Analyst China Financials		Joey Wong (13) Grassroots® Analyst
	Alex Jiang, Ph.D (5) Research Analyst China Healthcare		Chris Ye (10) ESG Analyst

Asian regional portfolio
management team

Taiwan analyst / portfolio
management team

**Grassroots®
Research**

External and internal
ESG research

Integrated
global research
platform



Source: Allianz Global Investors, as of March 1, 2019. Grassroots® Research is a division of Allianz Global Investors that commissions investigative market research for asset-management professionals. Research data used to generate Grassroots® Research reports are received from independent, third-party contractors who supply research that, subject to applicable laws and regulations, may be paid for by commissions generated by trades executed on behalf of clients. Number in the bracket means years of experience.

02

Why China A



China A-Shares - overview

- 
- Not investing in China A shares means missing 70% of the China equity opportunity set
 - Inclusion in MSCI indices is the start of a long journey with increasing foreign investment
 - A gradual institutionalization of A shares will likely change market dynamics
 - A-shares offer best exposure to China's long term economic growth potential
 - A-Shares offer long-term risk/return enhancement potential to global portfolios
 - Inefficient: significant alpha opportunity given lack of institutional coverage and participation

Not investing in China A means missing 70% of China equities

Major stock exchanges for China equities

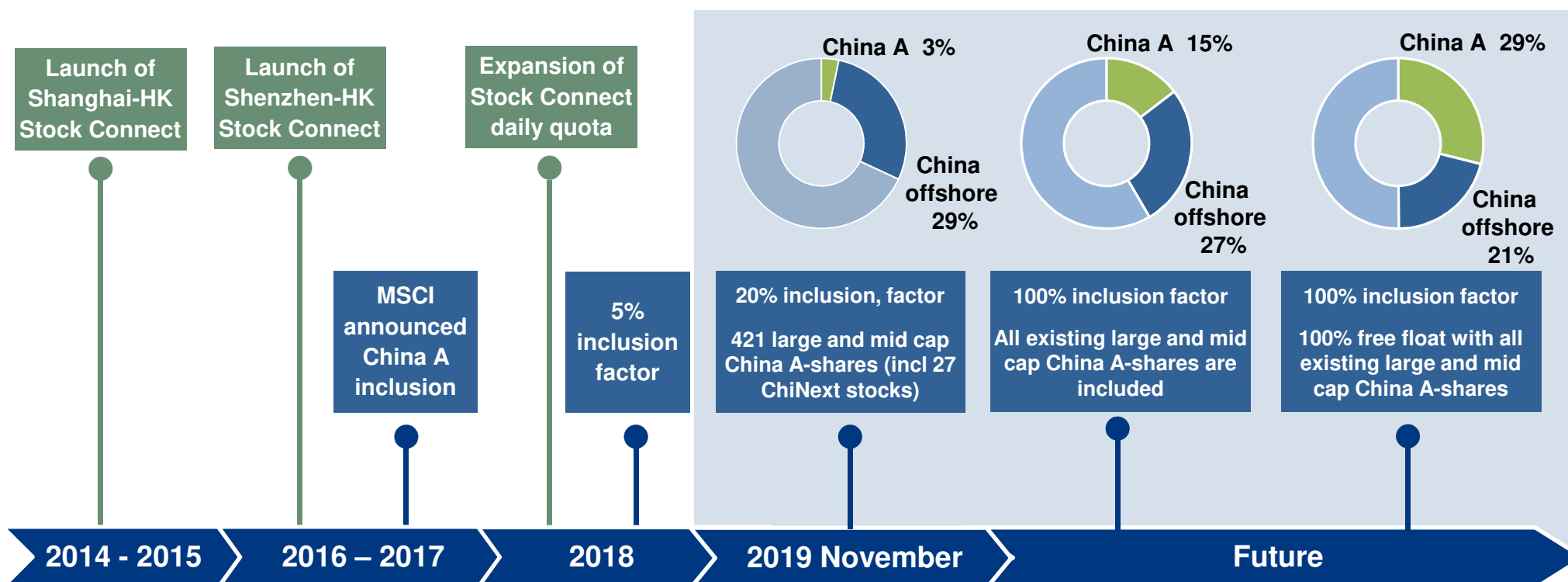


	Shenzhen A-shares	Shanghai A-shares	China Stocks listed in HK	US-listed ADRs	Total	Euro Area
Market cap (USD tn)	3.4	5.2	3.1	1.2	13.0	7.9
Number of stocks	2,143	1,458	1,096	171	4,868	4750

Source: Nasdaq, Bloomberg, Allianz Global Investors, as of March 31, 2019. Only the market cap of the listed share class by exchange is included. Offshore China stocks are defined based on companies with ultimate parent domiciled in China. Suspended stocks are excluded.

MSCI China A-shares inclusion to raise market profile

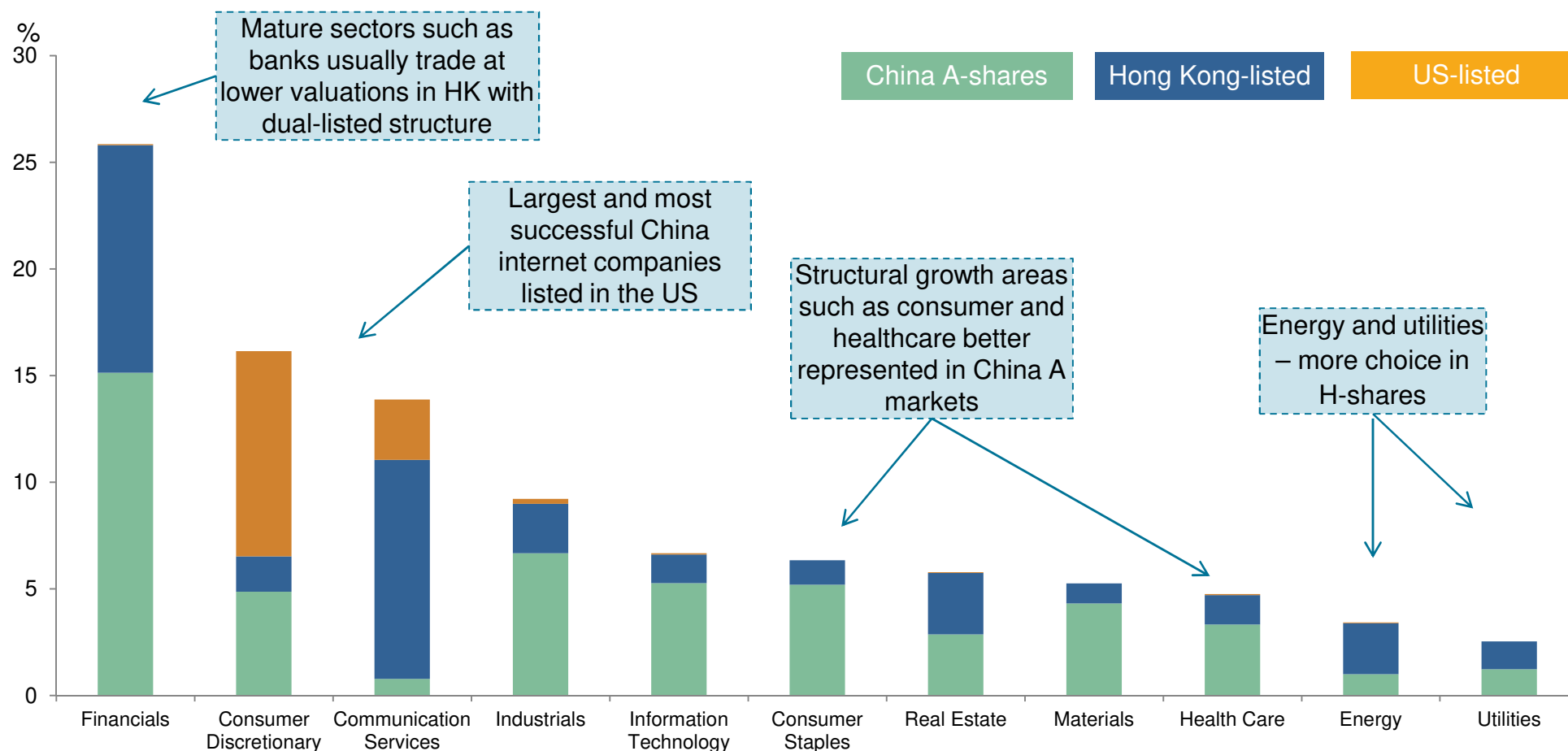
China A-shares: weighting in MSCI Emerging Markets Index



Source: MSCI, Citi, Bank of America Merrill Lynch, Allianz Global Investors, as of March 2019. Explanation of the index evolution pie charts: The chart on the left is calculated based on MSCI's proposal in March 2019 for inclusion as at November 2019. This includes 421 large and mid cap China A-share stocks included in the MSCI Emerging Markets Index, of which 27 are ChiNext stocks. The middle pie chart is based on the assumption that all China A shares are available to be included in MSCI Emerging Market Index under the current market structure. The pie chart on the right is based on the assumption that all China A shares are available to be included in MSCI Emerging Markets Index, without free float coverage being capped.

China A Shares: More diverse representation of China

Sector breakdown of MSCI All China Index



Source: Bloomberg, Allianz Global Investors, as of March 31, 2019. The above information is used for the purpose to demonstrate AllianzGI's research technique, it is not a recommendation or investment advice to buy or sell any particular securities and should not be considered investment advice.

China A-Shares: Low correlations, diversification benefits

Historical correlation between major equity markets

■ Low correlation
 ■ High correlation

	China A-shares	HK-listed China stocks	APxJ equities	GEM equities	Japan equities	US equities	European equities	World equities
China A-shares	1.00	0.58	0.43	0.41	0.24	0.30	0.29	0.32
HK-listed China stocks	0.58	1.00	0.90	0.88	0.54	0.58	0.62	0.66
APxJ equities	0.43	0.90	1.00	0.96	0.60	0.69	0.76	0.80
GEM equities	0.41	0.88	0.96	1.00	0.55	0.70	0.79	0.80
Japan equities	0.24	0.54	0.60	0.55	1.00	0.49	0.52	0.60
US equities	0.30	0.58	0.69	0.70	0.49	1.00	0.82	0.96
European equities	0.29	0.62	0.76	0.79	0.52	0.82	1.00	0.93
World equities	0.32	0.66	0.80	0.80	0.60	0.96	0.93	1.00

Source: Bloomberg, Allianz Global Investors, as of March 31, 2019. Correlation data is calculated based on historical return of respective MSCI indices for the past 10 years, using weekly USD return. China A-shares represented by MSCI China A Onshore Index. HK-listed China stocks represented by MSCI China Index. APxJ equities represented by MSCI AC Asia ex Japan Index. GEM equities represented by MSCI Emerging Markets Index. Japan Equities represented by TOPIX Index. US equities represented by S&P 500 Index. European equities represented by MSCI Europe Index. World equities represented by MSCI World Index

03(a)

Allianz China A-Shares

- Investment philosophy & process
- Portfolio positioning & performance




AllianzGI China A-Shares Equity strategy: key points

<i>Philosophy</i>	<ul style="list-style-type: none"> ✓ Bottom-up, fundamental, active investment. ✓ Growth at reasonable price approach.
<i>People</i>	<ul style="list-style-type: none"> ✓ High experienced co-Lead PMs with complementary skill sets, supported by proprietary analysis, Grassroots® Research and high level of company engagement.
<i>Process</i>	<ul style="list-style-type: none"> ✓ Growth, quality, valuation: Identify sustainable growth drivers through in-depth, targeted research. Set target prices to avoid overpaying for growth.
<i>Portfolio construction</i>	<ul style="list-style-type: none"> ✓ Close to benchmark sector weightings (+/-5%) ✓ Controlling impact of high levels of intra-market volatility.
<i>Performance goal</i>	<ul style="list-style-type: none"> ✓ Consistent, repeatable returns, driven by stock selection.

Co-Lead portfolio managers

 **38 years' combined experience, complementary skillsets**

 **Broad based alpha ideas, diversified performance drivers**

Anthony Wong, CFA
Portfolio Manager



Years with
the firm

7

Years of
experience

17

Sector focus

Consumer Staples

Consumer Discretionary

Healthcare

Financials (including Real Estate)

Energy

Sunny Chung
Portfolio Manager



Years with
the firm

13

Years of
experience

21

Sector focus

Industrial

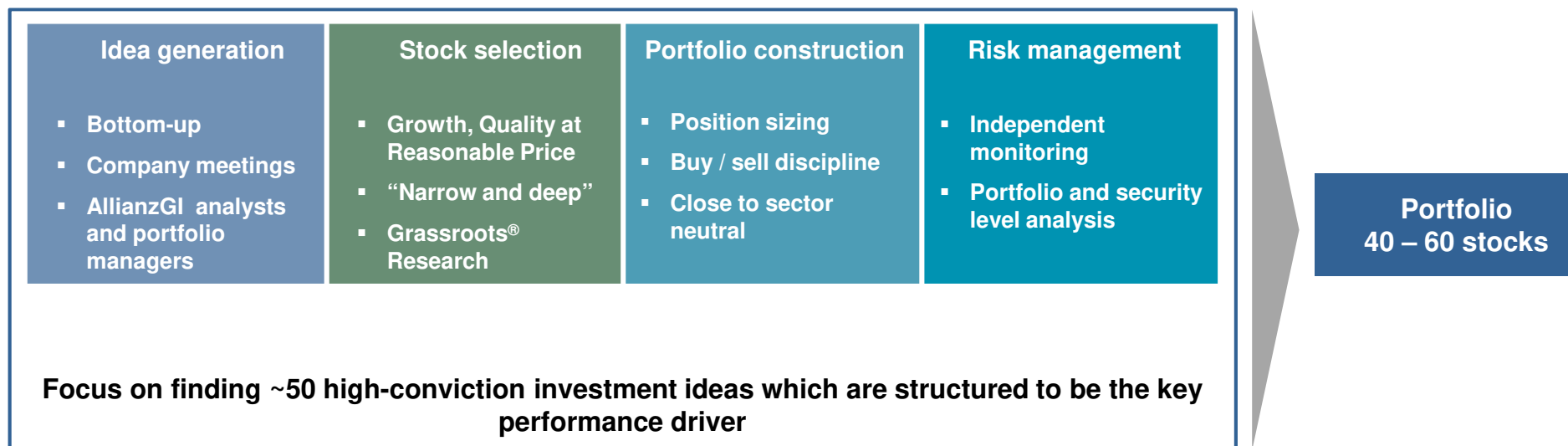
Technology / Communication Services

Utility

Material

Telecom Service

Investment process - overview

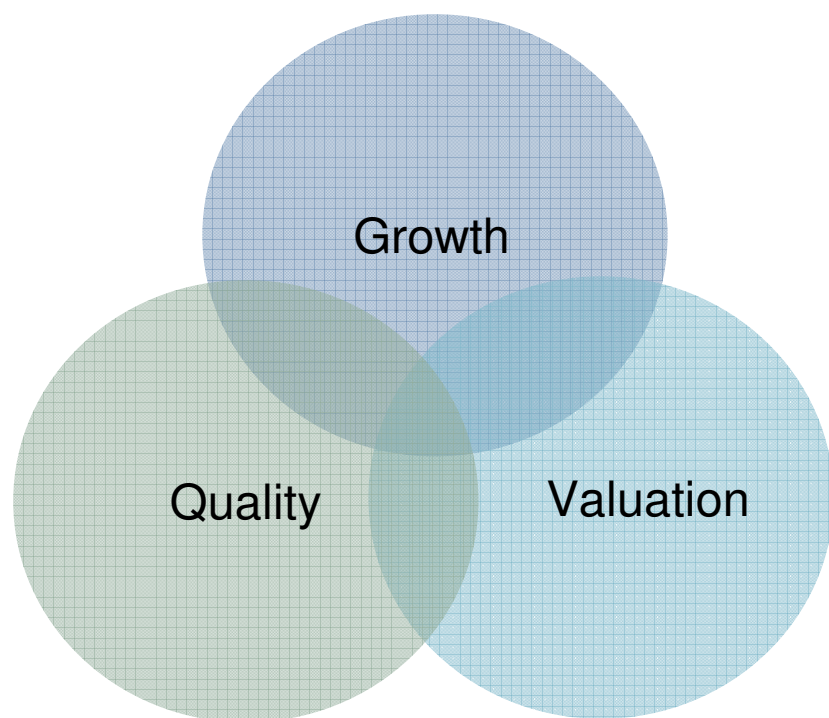


During any given stage of the investment process the selection criteria may vary from those shown above. The diagrams and statements above reflect the typical investment process applied to this strategy. At any given time other criteria may affect the investment process. See additional disclosure at the end of this presentation. Grassroots® Research is a division of Allianz Global Investors that commissions investigative market research for asset-management professionals. Research data used to generate Grassroots® Research reports are received from independent, third-party contractors who supply research that, subject to applicable laws and regulations, may be paid for by commissions generated by trades executed on behalf of clients.

In-depth due diligence, 'boots on the ground'

Companies that we like:

Sustainable Growth at Reasonable Valuation



How do we develop high-conviction ideas?

- ✓ **~1,000** company meetings, factory visits, and field trips each year
- ✓ **~45** Grassroots® research projects to get first-hand, real-time, unique information each year
- ✓ **2 – 3** months of research and analysis before we buy a new stock + continuous monitoring

Grassroots® stock example: Leading laser equipment manufacturer in China

Laser Equipment Adoption Rate in China (Jan 2018)

Why we needed a Grassroots® study?

- We hold industry No. 1 in our portfolio. This company might face increasing competition from No.2 domestic brand. We needed to check whether we should make a switch from No. 1 to No. 2 brand.

Who did we interview?

- 25 procurement engineers of laser equipment in China and Taiwan, mainly in areas of consumer electronics and automobile.

What was our finding?

- No.2 brand is very strong in R&D, but relatively weak in after-sales services.
- Industry No. 1 may gain further market share.

What actions did we take?

- Maintained our conviction on existing holding. Despite its market leader position, there is potential for further market share gain.



Quality: Largest laser equipment provider in China, supplying mainly to Apple component producers.



Growth: Intelligent manufacturing. Expanding application to new areas such as EV battery, industrial machines, automobile, shipbuilding.



Risk: Increasing competition from domestic and global peers.

Buy / sell discipline

What are we looking to buy?

Growth & Quality

- Structural growth potential, 'policy beneficiaries'
- Record of translating top-line growth to bottom-line profits
- Management aligned with shareholders

Valuation

- Re-rating potential – low absolute valuation or relative to historical returns
- Downside protection 'buffer'

When do we sell?

Valuation, price objective met

Change in analysis

- Management change
- Business model deteriorates
- Analyst downgrade

Better risk / return opportunities elsewhere

China A-Shares: Frequent sector rotation due to high level of retail investor participation

Performance of sectors within MSCI China A Onshore Index by calendar year

■ Top Performer
 ■ Bottom Performer

MSCI China A Onshore Index	Q1 2019	2H 2018	1H 2018	2017	2016	2015	2014	2013
Communication Services	33.27	(0.65)	(26.51)	(11.73)	(3.99)	25.70	43.03	20.50
Consumer Discretionary	29.06	(24.87)	(11.56)	22.54	(21.53)	22.76	22.01	26.23
Consumer Staples	48.31	(22.48)	(2.61)	73.49	(0.39)	13.45	13.82	(3.25)
Energy	19.69	(16.06)	(12.27)	11.37	(10.52)	(21.33)	18.14	(23.14)
Financials	31.40	(4.71)	(17.16)	27.97	(12.39)	(12.97)	89.82	(2.47)
Health Care	31.97	(33.38)	4.85	21.12	(16.02)	35.73	4.89	34.91
Industrials	29.18	(14.44)	(20.32)	9.35	(23.78)	12.20	52.31	6.05
Information Technology	46.18	(25.62)	(19.29)	29.35	(29.06)	48.05	9.56	45.14
Materials	28.21	(21.80)	(16.88)	21.16	(17.59)	1.58	35.51	(23.11)
Real Estate	35.61	(8.76)	(18.62)	19.79	(23.31)	30.62	77.04	(15.43)
Utilities	12.64	(2.71)	(11.38)	3.78	(22.56)	2.94	82.15	2.54

Rotation from winners to losers continued over the past year.

Frequent sector rotation is one of the striking traits of the China A-share markets

Portfolio construction

Stock selection is key driver of risk and return

Parameters	AllianzGI China A-Shares	Comments
Number of stocks	40 - 60	
Portfolio Beta	~1	No Market timing
Portfolio Turnover	50% - 100%	
Tracking Error	3 - 7%	
Active Share	~ 80%	Highly active approach, driven by stock positions
Sector Positioning	+/- 5%	Close to benchmark sector positioning
Maximum active stock position	< 5%	Taking into account contribution to portfolio risk

Source: Allianz Global Investors. The statements above reflect the typical investment process applied to this Strategy. At any given time other criteria may affect the investment process. See additional disclosure at the end of this presentation.

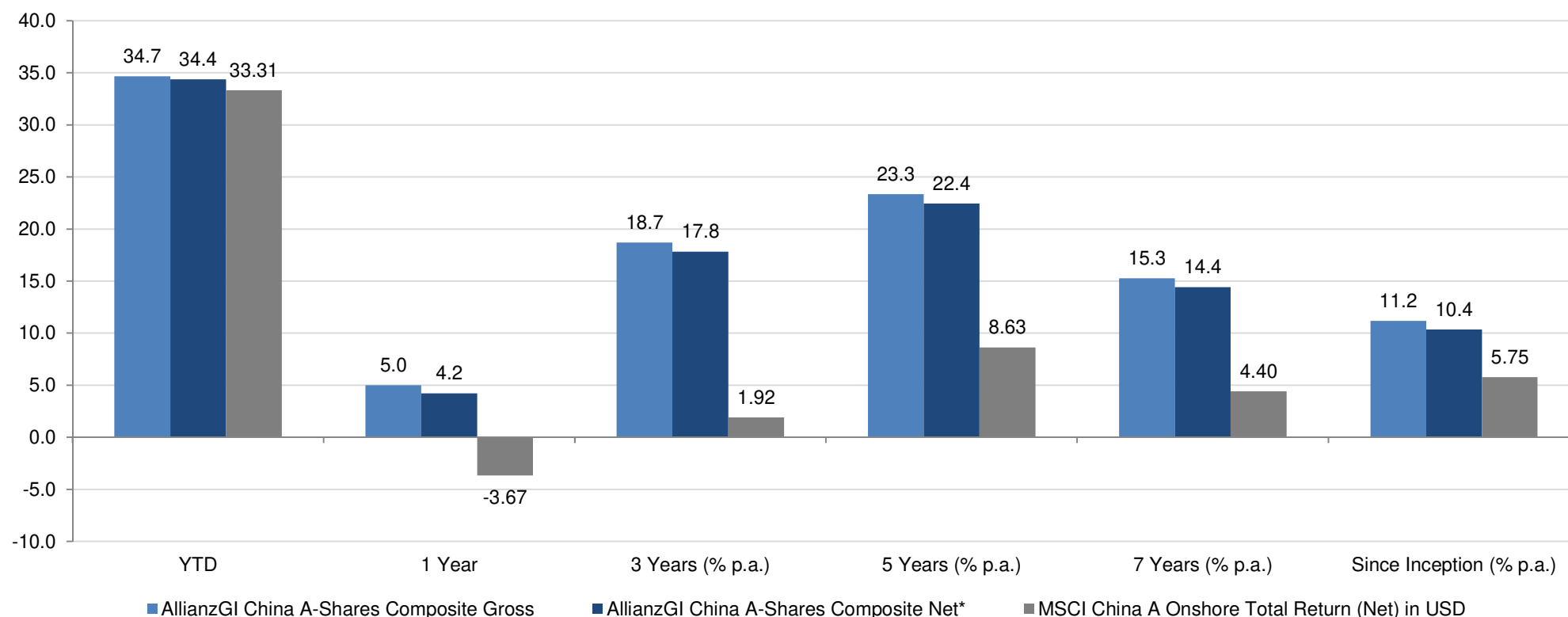
03(b)

Allianz China A-Shares

- Investment philosophy & process
- Portfolio positioning & performance



Consistent performance over the past decade



Over numerous regulatory changes and volatile markets, the AllianzGI China A-Share strategy has produced strong, consistent outperformance.

***Please note the composite net returns reflect the standard fee structure of the US LLC vehicle calculated on a price basis.**

Source: IDS, as of April 30, 2019. Composite performance inception date: May 1, 2009. Performance of less than one year has not been annualized. Past performance is not indicative of future results. The data above is supplemental information and supplements the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix. See additional disclosure at the end of this presentation.

Portfolio Snapshot

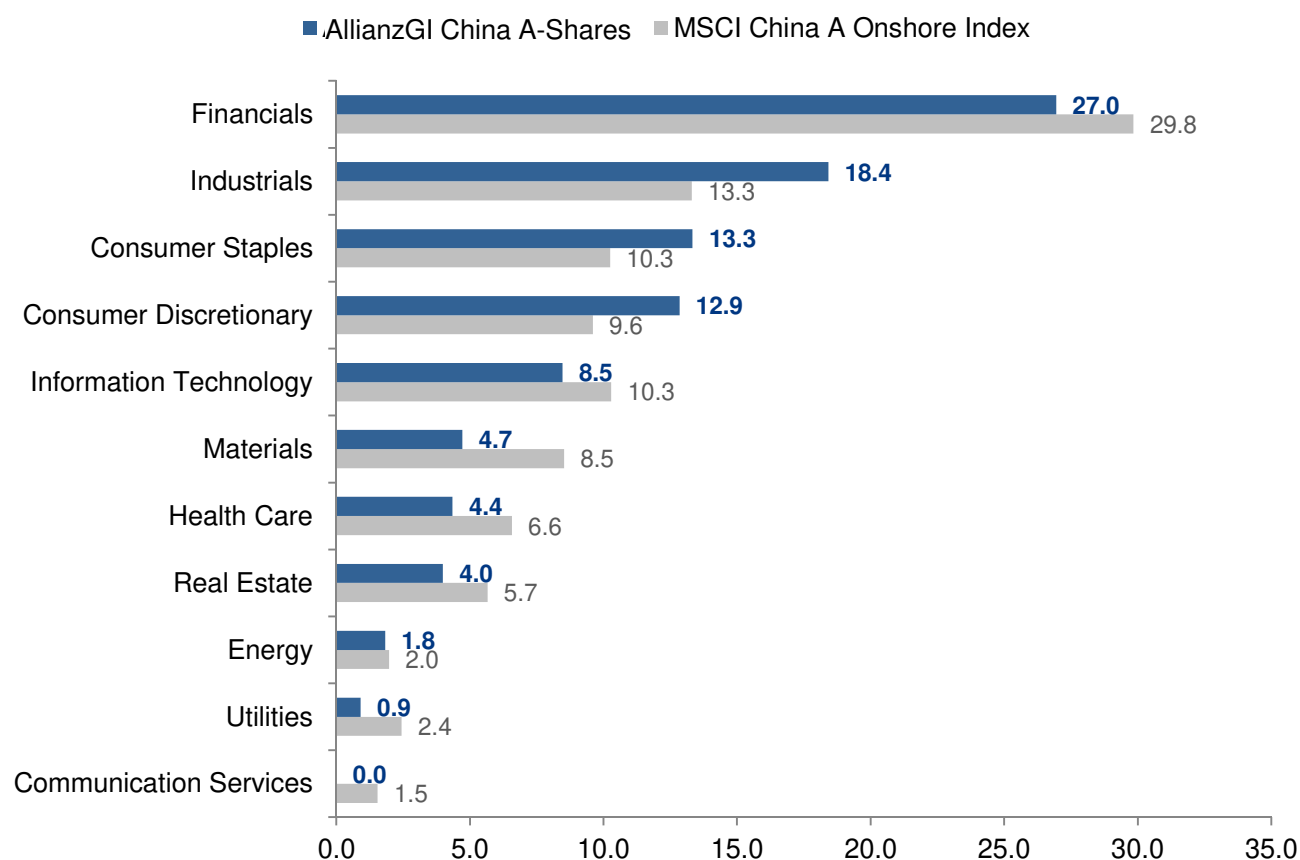
AllianzGI China A-Shares: Representative Account

Portfolio Parameters	AllianzGI China A-Shares Representative Account	MSCI China A Onshore Index
Number of Stocks	48	541
Tracking Error ex ante	4.86%	
- <i>Stock Specific Risk</i>	74%	
- <i>Factor Risk</i>	26%	
Active Share	75.30%	
Volatility ex ante	18.2%	18.0%
Beta ex ante	0.98	
P/E FY1	16.5 X	13.0 X
Market Cap (Avg.) USD	31.8 bn	34.9 bn

Source: Allianz Global Investors, as of March 31, 2019. Representative account characteristics are supplemental information and supplement the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix. See additional disclosure at the end of this presentation.

Sector Allocation: Typically +/- 5% deviation vs benchmark

AllianzGI China A-Shares Representative Account vs. MSCI China A Onshore Index

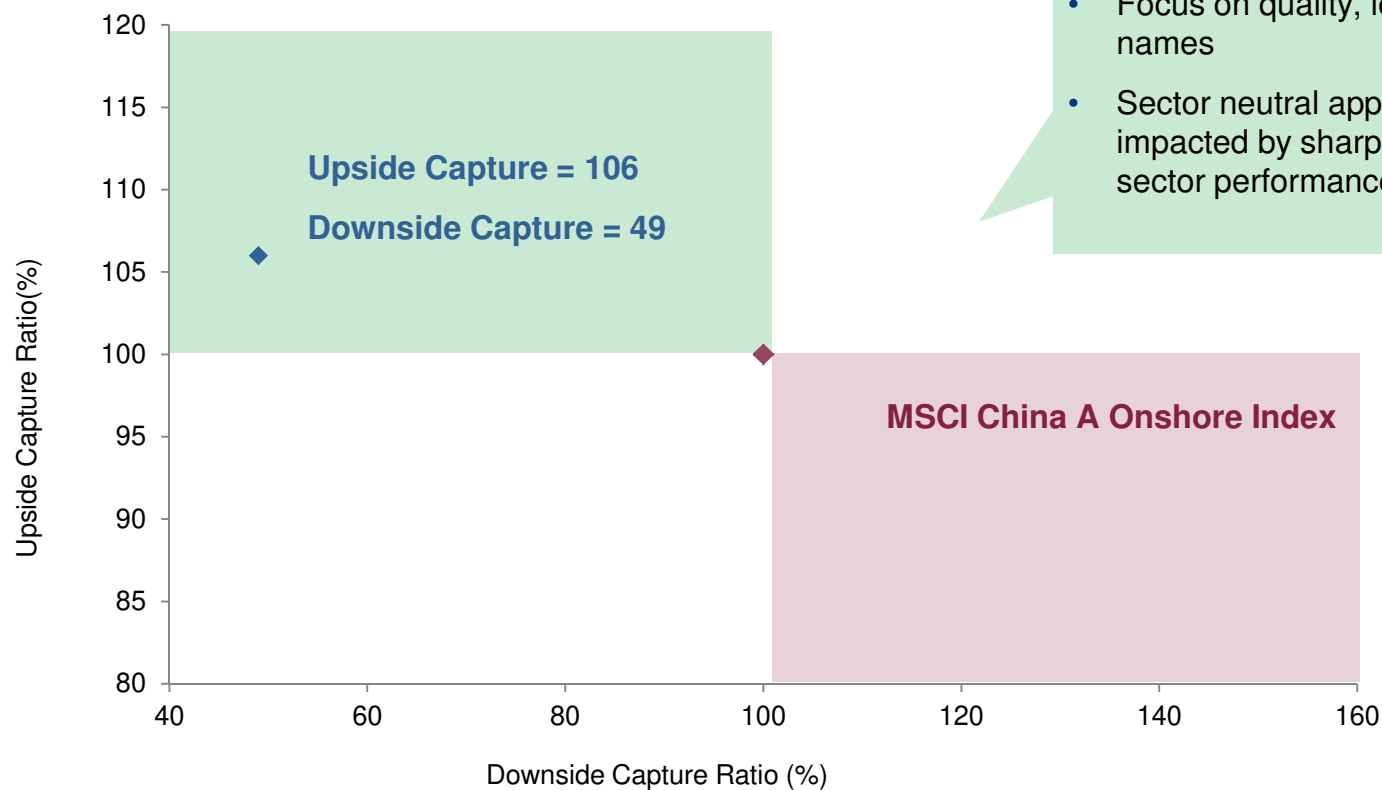


Source: Allianz Global Investors, as of March 31, 2019. Representative account characteristics are supplemental information and supplement the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix. See additional disclosure at the end of this presentation.

Strong Upside / Downside Capture Ratio

AllianzGI China A-Shares Representative Account vs. MSCI China A Onshore Index

3 -Year Upside / Downside Capture Ratio



Low downside capture ratio driven by:

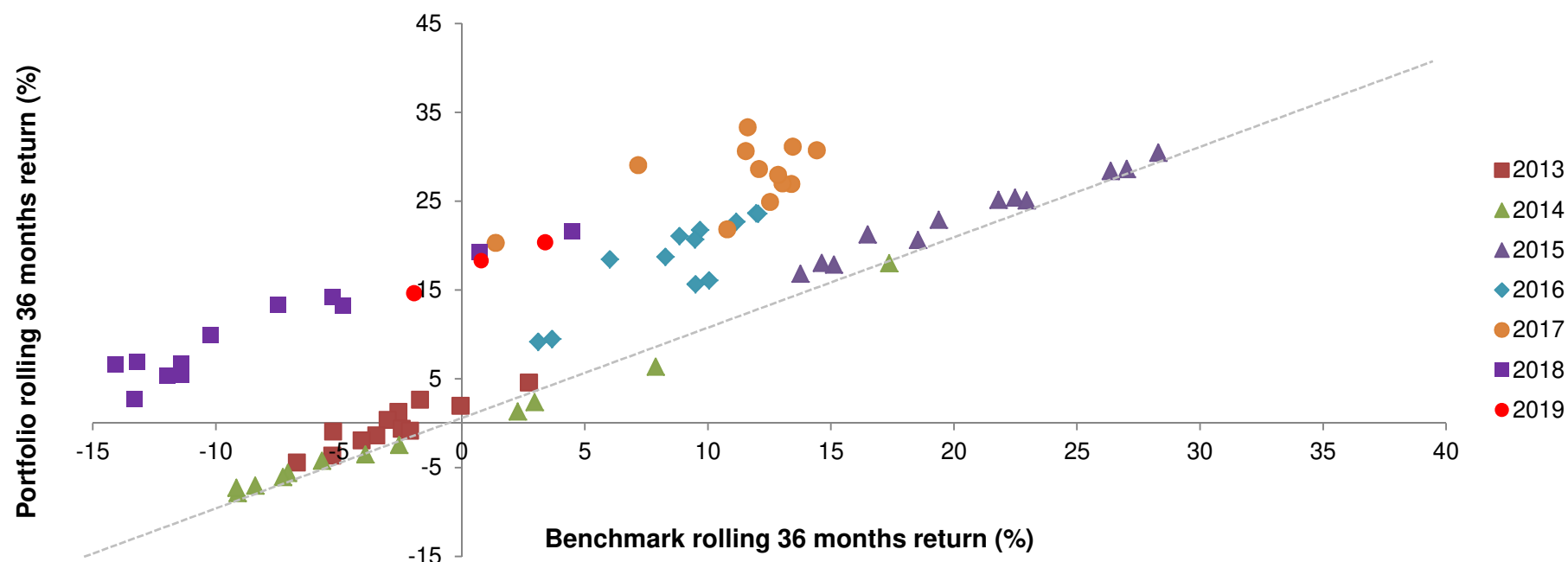
- Focus on quality, less speculative names
- Sector neutral approach, less impacted by sharp reversal of style / sector performance

Source: Morningstar, Allianz Global Investors, as of March 31, 2019. All performances are net USD performance. Past performance is not indicative of future results. The data above is supplemental information and supplements the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix. The account presented was selected by the firm as a representative account deemed to best represent this management style. See additional disclosure at the end of this presentation.

Consistent outperformance driven by stock selection

AllianzGI China A-Shares Representative Account vs. MSCI China A Onshore Index

Representative Account: Rolling 36-month gross returns



Attribution	2019 YTD	2018	2017	2016	2015	2014	2013
Stock Selection (%)	4.08	4.08	27.34	5.76	15.07	-3.63	1.39
Sector Allocation (%)	0.27	-0.08	1.04	-1.41	-1.75	2.94	0.76

Source: IDS, as of March 31, 2019. The benchmark refers to the MSCI China A Onshore Total Return (Net) in USD. Past performance is not indicative of future results. The performance shown above is gross and does not reflect the deduction of investment advisory fees. Attribution data is supplemental information and supplements the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix. The account presented was selected by the firm as a representative account deemed to best represent this management style. See additional disclosure at the end of this presentation.

Wide range of stock contributors across sectors

AllianzGI China A-Shares Representative Account vs. MSCI China A Onshore Index

Performance attribution by sector

	2019 YTD Attribution		2018 Attribution		2017 Attribution		2016 Attribution	
GICS Sector	Sector Allocation	Stock Selection	Sector Allocation	Stock Selection	Sector Allocation	Stock Selection	Sector Allocation	Stock Selection
Communication Services	-.08%	.12%	-.08%	-.22%	.29%	.00%	-.10%	.00%
Consumer Disc.	-.04%	-.07%	.02%	2.38%	.02%	4.24%	-.20%	.10%
Consumer Staples	.44%	.43%	.17%	-.55%	.99%	2.70%	.05%	1.60%
Energy	.07%	.66%	.00%	-.15%	-.09%	-.21%	-.17%	.20%
Financials	.01%	.43%	-.68%	.46%	-.67%	3.23%	-.26%	.58%
Health Care	-.04%	.26%	.32%	1.04%	.02%	3.35%	.00%	1.26%
Industrials	-.25%	3.42%	.13%	1.93%	.01%	8.49%	-.54%	.37%
Information Technology	-.37%	-.47%	.16%	-1.37%	.17%	4.08%	-.37%	.83%
Materials	.19%	-.33%	.17%	.43%	-.34%	.05%	-.10%	.84%
Real Estate	-.05%	-.31%	-.03%	.05%	.06%	1.32%	.11%	-.02%
Utilities	.38%	-.07%	-.28%	.09%	.60%	.08%	.16%	.00%
Total Equity	.27%	4.08%	-.08%	4.08%	1.04%	27.34%	-1.41%	5.76%

Source: IDS, as of March 31, 2019. The benchmark refers to the MSCI China A Onshore Total Return (Net) in USD. The performance shown above is gross and does not reflect the deduction of investment advisory fees. Past performance is not indicative of future results. The data above is supplemental information and supplements the AllianzGI China A-Share Equity GIPS compliant composite presentation in the Appendix.. The account presented was selected by the firm as a representative account deemed to best represent this management style. Additional information about the methodology used to calculate the performance attribution is available upon request. The Global Industry Classifications Standard (GICS®) is the exclusive property and a service mark of Morgan Stanley Capital International Inc. and Standard & Poor's, a division of The McGraw-Hill Companies, Inc. See additional disclosure at the end of this presentation.

04

Summary and Pricing



Investment Vehicles and Fees

Vehicle	Delaware LLC Commingled Pool
Total Expense Ratio	75 bps (65bps management fee with 10bps operating expense cap)
Liquidity	Daily with five international business days notification
Strategy Benchmark	MSCI China A Onshore Total Return Net Index
Minimum Investment	\$3 Million

Vehicle	Separate Account (Minimum \$50 million)
Management Fee	80 bps on first \$50 million 70 bps on next \$50 million 65 bps thereafter

Appendix



Biographies: Greater China Portfolio Managers

Christina Chung,
CFA



PORTFOLIO MANAGER (HONG KONG)

Christina joined the firm in 1998 and has been a managing director since January 2010. She is head of the Greater China Equity Team and lead manager of the Hong Kong, China and Greater China equity mandates. The Hong Kong and China Funds that she manages have won industry recognition and awards for consistent strong performance. She has 30 years of experience in managing Asian regional and single country portfolios for both institutional and retail accounts. Before joining the Group, she was a senior portfolio manager with Royal Bank of Canada Investment Management. Prior to that, she was a portfolio manager with Search International and an economist with HSBC Asset Management. Christina was educated in Canada. She attained a Bachelor of Administration from Brock University, followed by an M.A. in Economics from the University of Alberta. She became a Certified Management Accountant in 1992 and qualified as a chartered financial analyst, AIMR, in 1995.

Sunny Chung



PORTFOLIO MANAGER (HONG KONG)

Sunny joined the firm in 2006 based in Taiwan and subsequently moved to Hong Kong in 2015. He is a senior Portfolio Manager and co-lead manager of the China A-Shares strategy. In Taiwan he last held the position of Head of Domestic Equity Investment, responsible for overseeing the Taiwan equities team. Sunny has over 22 years of experience in investment related roles and was the portfolio manager of the AllianzGI Taiwan Equity Fund for over 8 years. The fund was awarded the Best Taiwan Fund by Smart Magazine/ Lipper for three consecutive years from 2013 to 2015, and the Morningstar/ Taiwan Golden Award for two consecutive years from 2014 to 2015. Prior to AllianzGI Taiwan, he was a portfolio manager with KGI Asset Management in Taiwan. Sunny received his MBA from Tamkang University as well as a bachelor's degree in Math from National Central University, Taiwan.

Anthony Wong,
CFA



PORTFOLIO MANAGER (HONG KONG)

Anthony joined the firm in 2012 as Portfolio Manager and is currently the co-lead manager for the China A-Shares equity portfolios. Prior to joining the Group, Anthony worked as a Director, Portfolio Manager at Bank Julius Baer where he was responsible for managing the Julius Baer China Fund, a QFII classified mutual fund that invests in China-listed A-shares and Hong Kong listed H-shares. Anthony had also worked at Yinhua Fund Management, Shenzhen as Deputy Head of Foreign Investment, where he managed the Hong Kong equity sub-portfolio of Yinhua QDII Global Core Equity Fund, and formulated the investment strategies for the Hong Kong equity market. Anthony's working experience in the fund management industry started in 2002. Anthony is a CFA charterholder and holds a Master of Science in Finance from the London Business School, a Master of Business Administration from the Hong Kong University of Science and Technology and a Bachelor of Business Administration from the Chinese University of Hong Kong.

Biographies: China Equity Research

Terence Law, CFA



HEAD OF RESEARCH, ASIA PACIFIC

Terence joined as Senior Research Analyst in 2005. He has been a Director since 2009 and has assumed the role of Head of Research, Asia Pacific in 2011. Throughout his industry experience in equity research, he has focused primarily on the financial sectors in Asia. Prior to joining the Group, Terence was Regional Banking Analyst at Cazenove (acquired by Standard Chartered Bank), one of several investment banks he worked for. Before that, Terence was an Administrative Officer at the Hong Kong Government. He graduated from the Chinese University of Hong Kong with a Bachelor degree in Business Administration and is also a CFA Charter holder. Terence is fluent in English, Cantonese and Mandarin.

Sophia Zhang



RESEARCH ANALYST – CHINA (HONG KONG)

Sophia joined the firm as a Graduate Trainee in 2008. She worked primarily with Grassroots® Research and managed Grassroots® projects for applications on Asian equities during the 18-month training. After the completion of the Global Graduate Trainee programme, she worked as a Research Associate covering financial sectors in Asia Pacific ex Japan. Currently, she is part of the Greater China Equity Team and works as a dedicated country analyst focusing on Hong Kong and China companies. She attained a BBA degree in Accounting from the Hong Kong Baptist University and graduated with First Class Honors.

Terry Chen, CFA



RESEARCH ANALYST – CHINA (HONG KONG)

Terry joined AllianzGI in August 2017 as Senior Research Analyst covering internet stocks in Asia Pacific. Before joining the Group, Terry worked as a research analyst for 9 years at both HSBC and CLSA where he focused on the internet and China/HK telecom sectors. He also previously worked as an auditor at PricewaterhouseCoopers.

Terry holds a bachelor's degree in accounting and finance from Hong Kong University of Science and Technology. He is also a CFA charterholder and a Certified Public Accountant.

Biographies: China Equity Research

Kevin You



RESEARCH ANALYST – CHINA (HONG KONG)

Kevin joined the firm in 2015 as Research Analyst and he is currently responsible for covering companies in China. With more than 10 years of experience in the industry, Kevin has gained extensive research experience. Prior to joining us, he worked with Credit Suisse, Samsung Securities and CIMB Securities focusing on China equity research. Kevin attained a Master's degree in Risk Management Science from the Chinese University of Hong Kong and a Bachelor's degree in Business Economics from University of Durham, UK.

Marco Yau



RESEARCH ANALYST – CHINA (HONG KONG)

Marco is a Hong Kong-based research analyst with Allianz Global Investors specializing in the China financials sector. He joined the firm in October 2018. Marco has six years of industry experience. Before joining Allianz Global Investors, he worked at CEB International Capital and CLSA Ltd, specializing in China financials. Marco holds a Bachelor of Arts degree with a Double Major in Economics and Translation from the University of Hong Kong.

Alex Jiang, Ph.D



RESEARCH ANALYST – CHINA (HONG KONG)

Alex is a Hong Kong-based research analyst with Allianz Global Investors specializing in the Asian healthcare sector. He joined the firm in September 2018. Alex has six years of research experience and was ranked second in the 2017 Thomson Reuters Best Healthcare Stock Picker award. Before joining Allianz Global Investors, he worked at UOB Kay Hian specializing in the China healthcare sector. Prior to joining the financial services industry, Alex was awarded a Ph.D. from the Hong Kong University of Science and Technology (HKUST) and subsequently spent four years in a program focused on cancer therapy and muscle stem cell development. He holds a Bachelor of Science degree from Shanghai Jiao Tong University.

Biographies: China Equity Research

Catherine Chan



RESEARCH ANALYST – CHINA (HONG KONG)

Catherine is a Hong Kong-based research analyst with Allianz Global Investors. She joined the firm in 2016 and was responsible for research on consumer companies across Asia ex Japan. She later took on the role as a China equity analyst focusing on energy and materials companies in China and Hong Kong.

Before joining the firm, Catherine worked at Citi Investment Research where she was a research analyst focused particularly on the China consumer sector. With 10 years of industry experience, she also previously worked at Standard Chartered (formerly Cazenove Asia) as a research analyst. Catherine holds a Bachelor of Arts degree in Economics and Mathematics from Mount Holyoke College in the US as well as a Master of Sciences in Finance from Tanaka Business School at Imperial College, London.

Belvis Wong



PORTFOLIO MANAGEMENT TEAM – ALL STRATEGIES

Belvis joined the firm with the Greater China Team in 2015 and has over 6 years of experience in the financial industry. His role is to assist the Portfolio Managers with the management of their strategies, including areas such as portfolio trading and trade implementation. As well as supporting day-to-day portfolio management responsibilities, he has also helped with the management of proxy voting events. Before joining the group, he was an Investment Officer with Royal Bank of Canada Wealth Management.

Belvis attained a Honors B.S.c degree in Economics and Mathematics from University of Toronto. He is also a CFA and FRM charterholder.

Risk Management – contribution to portfolio risk

AllianzGI China A-Shares Representative Account vs. MSCI China A Onshore Index

- Position size of each holding determined with reference to:
 - Conviction
 - Contribution to portfolio risk
- Prefer to initiate holdings with smaller position sizes and add as conviction grows
- Maximum 5% active position
- Portfolio also monitored for ‘top-down’ risk
 - Total volatility
 - Portfolio beta

Top Ten Contributors to Tracking Error

Company	Portfolio Weight	Benchmark Weight	Contribution to Tracking Error
Amoy Diagnostics Co Ltd	1.6%	0.0%	9.2%
Wuliangye Yibin Co. Ltd	4.7%	1.3%	6.7%
Shenzhen Goodix Technol	1.5%	0.0%	5.8%
Contemporary Amperex Te	1.5%	0.0%	5.7%
Jiangsu Hengli Hydraul	3.9%	0.1%	5.5%
Luxshare Precision Indu	3.0%	0.5%	4.6%
Angel Yeast Co. Ltd.	2.5%	0.1%	3.4%
Shanxi Xinghuacun Fenwi	2.2%	0.1%	3.3%
Wuxi Lead Intelligent E	1.8%	0.0%	3.1%
Shennan Circuits Co Ltd	1.1%	0.1%	2.8%

Source: IDS GmbH – Analysis and Reporting Services, Allianz Global Investors, as of March 31, 2019. Benchmark refers to the MSCI China A Onshore Index in USD. The Top 10 Risk Contributors are those equity stocks contributing the largest proportions of Tracking Variance relative to the benchmark. Representative account data is supplemental information and supplements the AllianzGI China A-Share Equity GIPS® compliant composite presentation in the Appendix. The top ten holdings are subject to change and will vary over time. References to specific securities and their issues are examples of securities held and not intended to be, and should not be interpreted as an offer, solicitation or recommendation to purchase or sell any financial instrument, an indication that the purchase of such securities was or will be profitable, or representative of the composition or performance of the portfolio. The securities identified do not represent all securities purchased, sold or recommended for client accounts. Actual holdings will vary for each client and there is no guarantee that a particular client's account will have the same characteristics as described above. The account presented was selected by the firm as a representative account deemed to best represent this management style. See additional disclosure at the end of this presentation.

China A-Shares: Valuations recovering from historical bottom level

MSCI China A Onshore – Forward 12 Month P/E Ratio



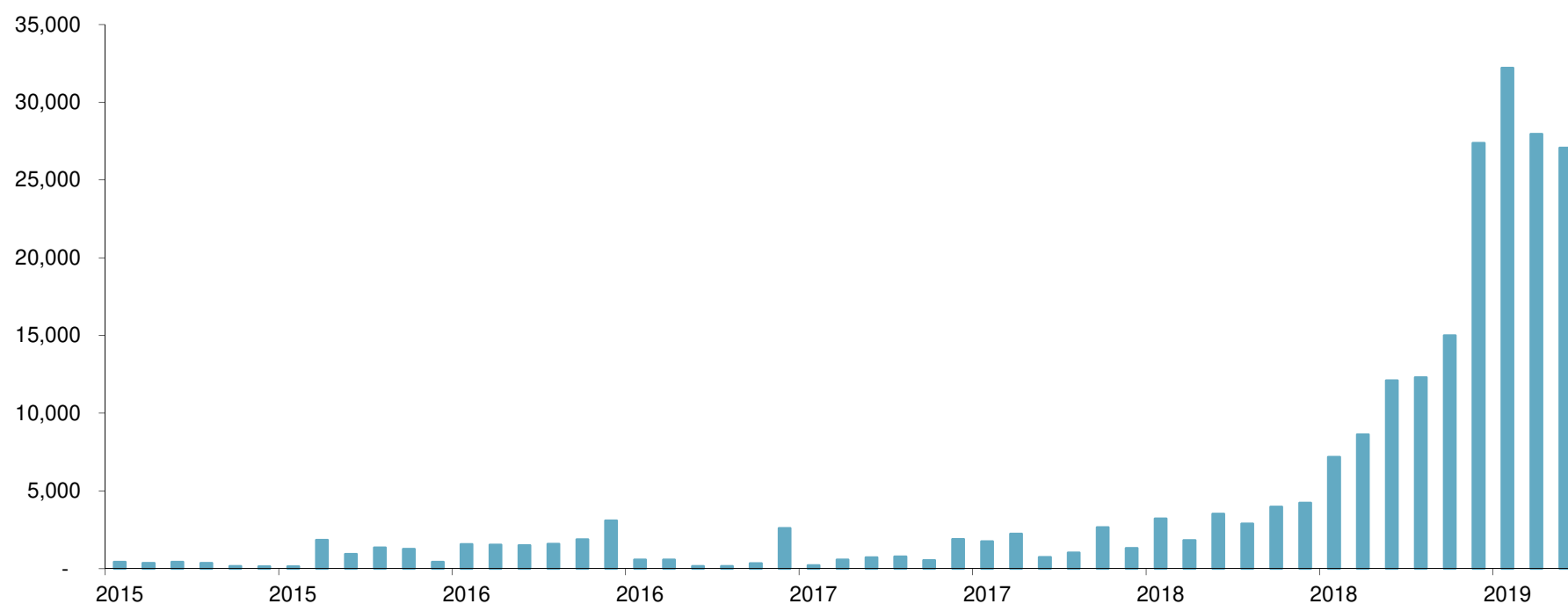
MSCI China A Onshore – Price to Book Ratio



Source: Bloomberg, Allianz Global Investors, as of February 28, 2019.

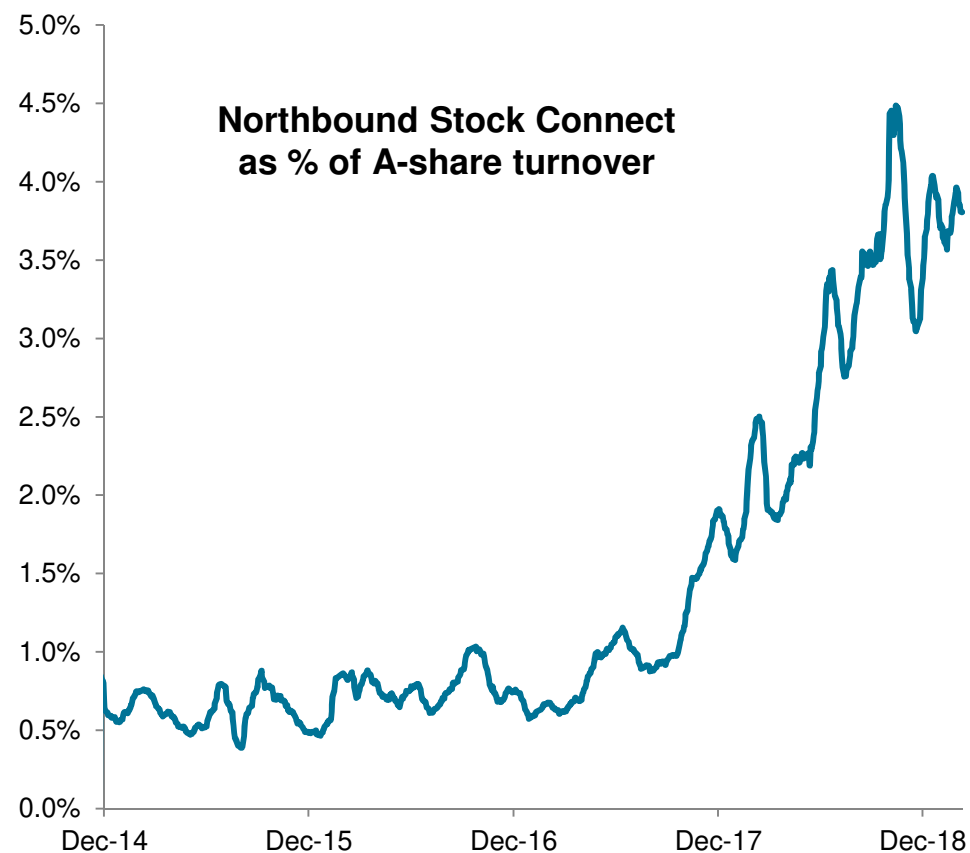
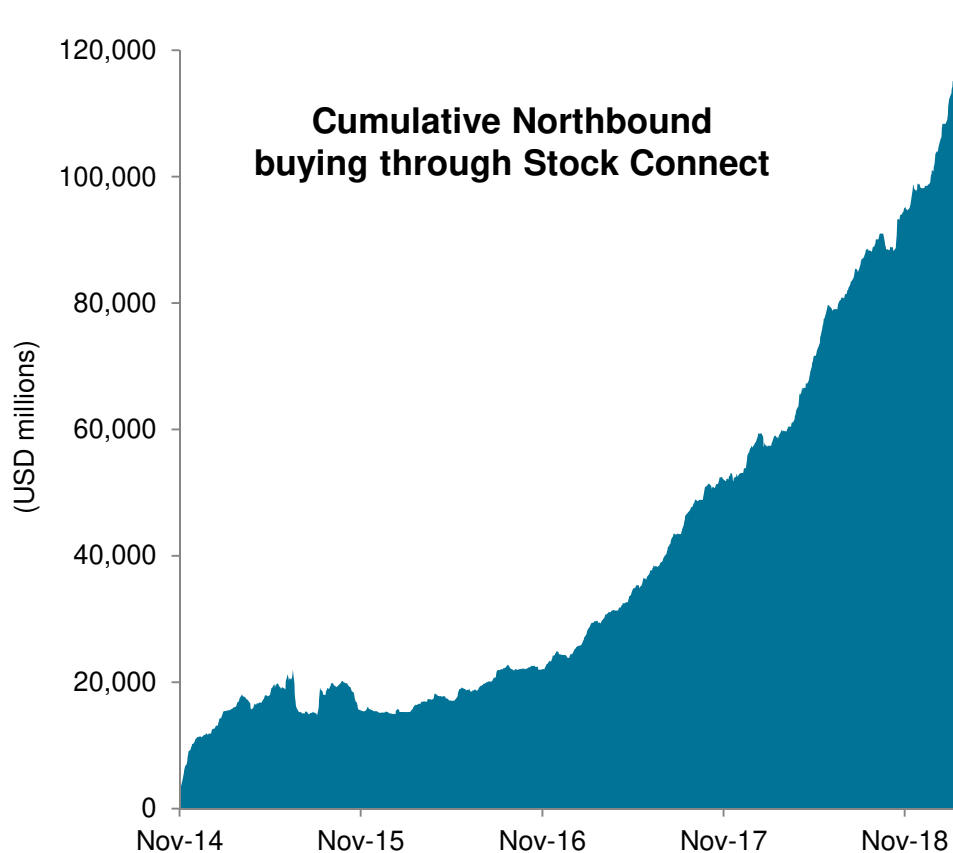
China A-Shares: Shares buybacks on the rise

China A-Shares – value of buybacks (RMB million)

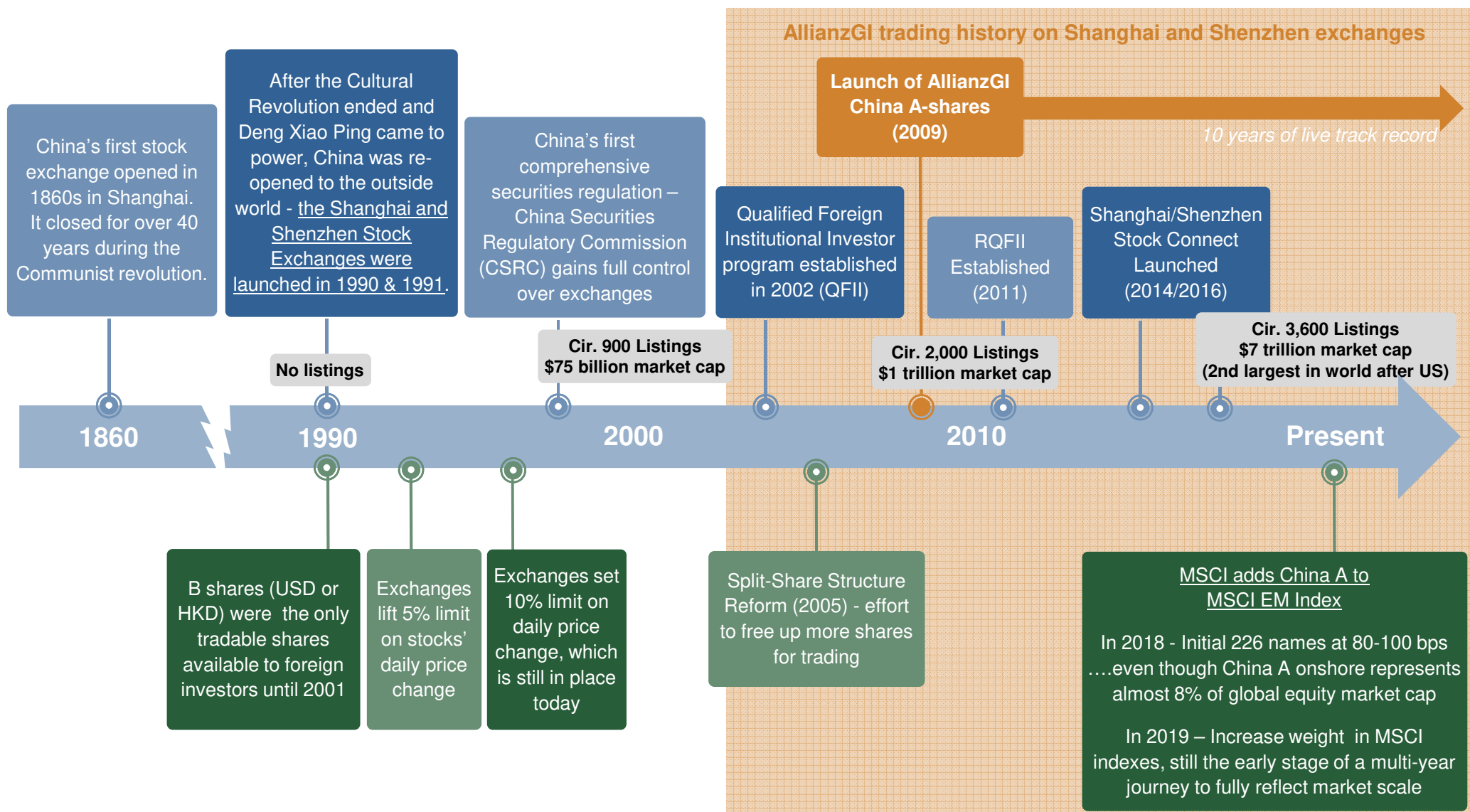


Source: HSBC Qianhai Research, as of March 31, 2019. Monthly data can include some duplicates as buybacks are conducted within an extended period therefore double counted in different periods.

Significant pick up in Northbound buying into A-shares

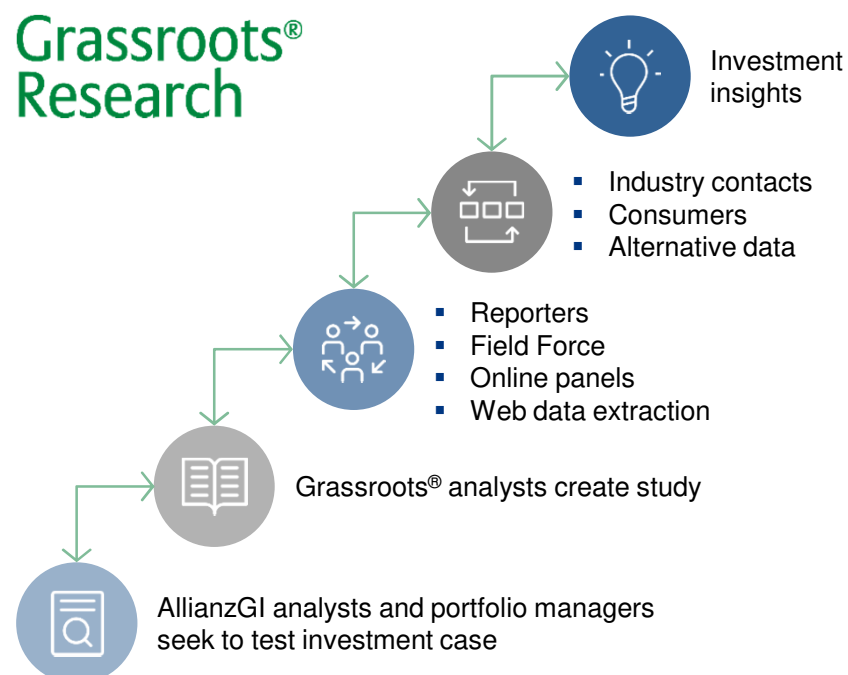


Evolution of China's A-Share Markets



Grassroots® Research gives us “boots on the ground”

Grassroots® Research



Grassroots® Research is a proprietary tool that provides our investment professionals with customised market research designed to answer specific questions about key stock and industry drivers.

- Collaborative in-house study design among AllianzGI research analysts, portfolio managers and Grassroots® analysts
- Utilizes local expertise of 60+ independent journalists and 300+ Field Force investigators to interview sources around the world
- Utilizes technological tools to target thousands of consumers and businesses online and extract alternative data from the Web



Grassroots® Research aims to identify inflection points in business trends and increase conviction in decision-making.

Investigative and original market research



30+ years of experience

Global resources

350+ custom reports per year

Recent Grassroots® topics with China focus

Consumer

- Pizza Hut, KFC in China with Consumer Survey
- White Liquor Demand in China
- Electric Logistics Vehicles Purchase Intention in China
- Dairy Product Market in China
- Passenger Car Market in China
- After-school Education Market in China Consumer Survey
- Cheers Sofa and Bedding Products in China
- Domestic SUV sedan consumer preference in China
- Dali Soymilk Drinks in China
- WH Group in China
- Payment Trends in China Consumer Survey

Information Technology

- E-commerce Merchants Opinion in China
- Live Broadcasting Trends in China Consumer Survey
- Active Alignment Demand for Camera Modules Assembly in China
- Online Advertising in China

Financials

- Consumer Loans Survey in China
- Consumer Loans Trend in China 04-17
- Bank Branch Manager Survey in China 02-17

Industrials

- Hongfa's Relay Products in China
- Hengli Hydraulic in China
- Waste Water Treatment Equipment in China

Healthcare

- Vision Care Market in China Consumer Survey
- CSPC's Oncology Drugs in China
- CSPC's NBP for Stroke and Dementia Treatment in China

Others

- China Telco Consumer Survey
- Paper Market in China

Stock example: A large Chinese hydraulics products manufacturer

Idea generation:	Tour of site visits in mainland China by our industrial analyst
Due diligence:	Plant visits, meeting with management, Grassroots® research, cross check with competitors and downstream customers
Investment thesis:	Mispriced growth. Valuation only reflects cyclical upturn in machinery demand, not structural growth of market share gain and new product development.



Quality: One of the largest producers of hydraulics products in China. Ranks among the top 10 globally, supplying products to both domestic and international clients. High entry barrier market, long development cycles




Growth: Benefit from rising demand for construction machinery in China. Market share gain replacing overseas competitors, also expanding product offerings from cylinder to pumps and valves.



Valuation: Expect EPS growth at ~25%, initiated at PEG ~0.5x




Global digital platform fosters open discussion




Shannon Zheng ▾ Help & Training **investors** ▾

Home Help Chatter **Stocks** Portfolios Reports Follow Drivers Coverage Connections GRSM Equities Research Other ESG +


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Sophia Zhang

Regarding to circular issued in Apr 2 for General Mandates of AGM to be hold in May 4

Analyst recommends to vote for the following 2 items which ISS has voted against:

- Items 3: re-election of independent director Julian Wolhardt. ISS voted against because Mr Wolhardt's attendance was below 75% in 2017. According to IR of company, Mr Wolhardt's had to excuse

Topics: Proxy Voting; Management proposals

Comment Like April 23, 2018 at 10:32 AM

Blaine Abraham, Pan Yuning, Grant Yun Cheng, and 5 others like this

Show All 4 Comments

Eugenie Jackson

AllianzGI policy recommendations attached.

nzgi_research_2018_1220280_AllianzGI

Download pdf (236 KB) More Actions ▾

Like April 23, 2018 at 7:04 PM


Intrinsic Ratings ▾

Analyst: **SZ** Vote: 4 Px: 22.06 Div Yield: 1.2% [All Posts for 2319 HK](#)

INTRINSIC RATINGS

	E	S	G	D	F
Default/3rd Party	1.7	5.8	5.7		
Internal/Proprietary	3				
Dissenting Opinion Flag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

COLLABORATION/DEBATE



-- Blaine Abraham

Environment changed from 1.7 to 3

is highly exposed to water risk, which faces pressure from drought risk, increased taxation, and competition; Mengniu has also provided evidence to suggest the company is improving its environmental footprint enough to warrant an upgrade...

Topics: Intrinsic-E, Intrinsic Conclusion

February 27, 2018 at 12:57 AM


-- Sophia Zhang

Environment flagged

Firm-wide, global discussion including change in investment view, ESG issues, voting and engagement

MSCI intrinsic ratings feeding into the system

Internal ESG research to override

ESG analyst can review the case and give a final score

Analyst / PM initiate E,S,G score reviews

Analyst recommends to change Environmental rating from 1.7 to 3 after discussing various ESG issues with the company IR.

Source: Allianz Global Investors, as of May 17, 2018. The above information is provided for illustrative purposes to demonstrate AllianzGI AP's research technique, it is not a recommendation or investment advice to buy or sell any particular securities and should not be considered investment advice. See additional disclosure at the end of this presentation.

AllianzGI China A-Share Equity

Composite performance in US dollars and disclosure notes

Period	Gross Composite Return (%)	Net Composite Return (%)	Benchmark (%)	Delta (%)	Tracking Error (%)	Information Ratio	3yr Standard Deviation Composite (%)	3yr Standard Deviation Benchmark (%)	Dispersion (%)	Number of Portfolios	NAV (USD mn)	Total Firm Assets (USD mn)	Period	Composite Gross Return p.a. (%)	Benchmark p.a. (%)
2018	-24.13	-25.80	-32.99	8.86	7.38	1.20	21.95	21.54	NA	2	490.87	N/A	1 Year	-24.13	-32.99
2017	48.99	45.62	20.28	28.71	5.75	4.99	26.16	27.45	NA	1	181.21	554,012	2 Years	6.32	-10.22
2016	-4.29	-6.46	-19.11	14.81	14.36	1.03	31.29	30.52	NA	1	27.24	464,587	3 Years	2.66	-13.29
2015	22.04	19.27	7.08	14.96	7.65	1.95	27.59	27.65	NA	1	34.48	435,785	4 Years	7.19	-8.59
2014	43.25	40.00	46.53	-3.28	11.35	-0.29	24.21	23.47	NA	1	73.12	429,247	5 Years	13.59	0.46
2013	1.96	-0.37	0.75	1.20	5.82	0.21	18.48	21.61	NA	1	56.63	420,927	6 Years	11.57	0.51
2012	12.14	9.94	9.48	2.66	5.16	0.52	20.58	23.34	NA	1	64.29	359,447	7 Years	11.65	1.74
2011	-23.05	-23.84	-22.91	-0.14	3.83	-0.04	NA	NA	NA	1	75.77	137,567	8 Years	6.57	-1.73
2010	2.36	1.34	-4.37	6.72	6.42	1.05	NA	NA	NA	1	113.52	149,654	9 Years	6.10	-2.02
2009*	25.79	24.98	36.71	-10.92	NA	NA	NA	NA	NA	1	90.25	140,639	Since Inception*	8.20	1.34

*Performance since date of inception

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This composite was created in May 2009 and includes all fee-paying, discretionary China A-share equity portfolios managed by the firm that invest in the shares of companies that are incorporated in China and that are listed as A-shares on the stock exchanges of Shanghai or Shenzhen with the investment objective to achieve long-term capital growth. A maximum of 20% of the portfolios may be invested in other stocks of companies that are incorporated in China or that generate a predominant portion of their profits there. The benchmark applied to the composite is MSCI China A Onshore Total Return (Net) Index which tracks the performance of a China A-share equity universe and includes A-share securities listed on both Shanghai and Shenzhen Stock Exchanges. In contrast to the benchmark, the portfolios forming this composite do contain cash. The portfolios within this composite may and do invest in non-benchmark securities. Unless otherwise shown in the composite table, no composites contain carve-outs from balanced portfolios. All data as of 31 December 2018 unless otherwise noted. Performance results are expressed in the currency stated in the heading of this presentation page.

The standard management fee scale for segregated accounts for this product starts at 0.80% p.a. on the first US\$50 million and will be lower by tiers whilst the management fees for mutual funds are much higher in general. Details can be provided upon request. Actual fees may vary depending on, among other things, the type of client, the amounts of assets under management and may include performance based fee.

Past performance is no guarantee of future results. Individual account performance will vary. Gross returns were calculated on a total return basis, including all dividends and interest, accrued income, realized and unrealized gains or losses, and are net of all brokerage commissions, execution costs and irrecoverable withholding taxes on dividends, interests and capital gains, and do not give effect to investment management fees (asset based and, where applicable, performance based) which would reduce such returns. Net returns, where appropriate, were calculated on a total return basis, including all dividends and interest, accrued income, realized and unrealized gains or losses, and are net of all brokerage commissions, execution cost, irrecoverable withholding taxes on dividends, interests and capital gains, and investment management fees. Currency hedging may be effected as a normal part of the discretionary fund management where it is considered beneficial in order to minimize exposures to fluctuations in exchange rates prevailing between the different country currencies and the portfolio base currency. Composite returns include any benefits or costs of such currency hedging transactions. The dispersion of annual returns is measured by the standard deviation across equal-weighted account returns represented within the composite for the full year. Additional information regarding policies for calculating and reporting returns and a complete list and description of all of the firm's composites are available upon request. Unless otherwise noted, index returns are presented as total returns, which reflect both price performance and income from dividend payments, if any, but do not reflect fees, brokerage commissions or other expenses of investing.

Internal dispersion is not presented where there are fewer than six accounts in the composite for the whole period. "NA" has been reported under "3yr Standard Deviation" when 36 monthly returns are not available.

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Active is:

Allianz Global Investors



Presentation to Alaska Retirement Management Board

Schroder China A-Shares

June 21, 2019

Jack Lee, CFA: Lead Portfolio Manager

Raymond Maguire, Ph.D: Head of Equity Research, Asia

Allan Duckett: Institutional Director

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Introduction to Schroders Investment Management

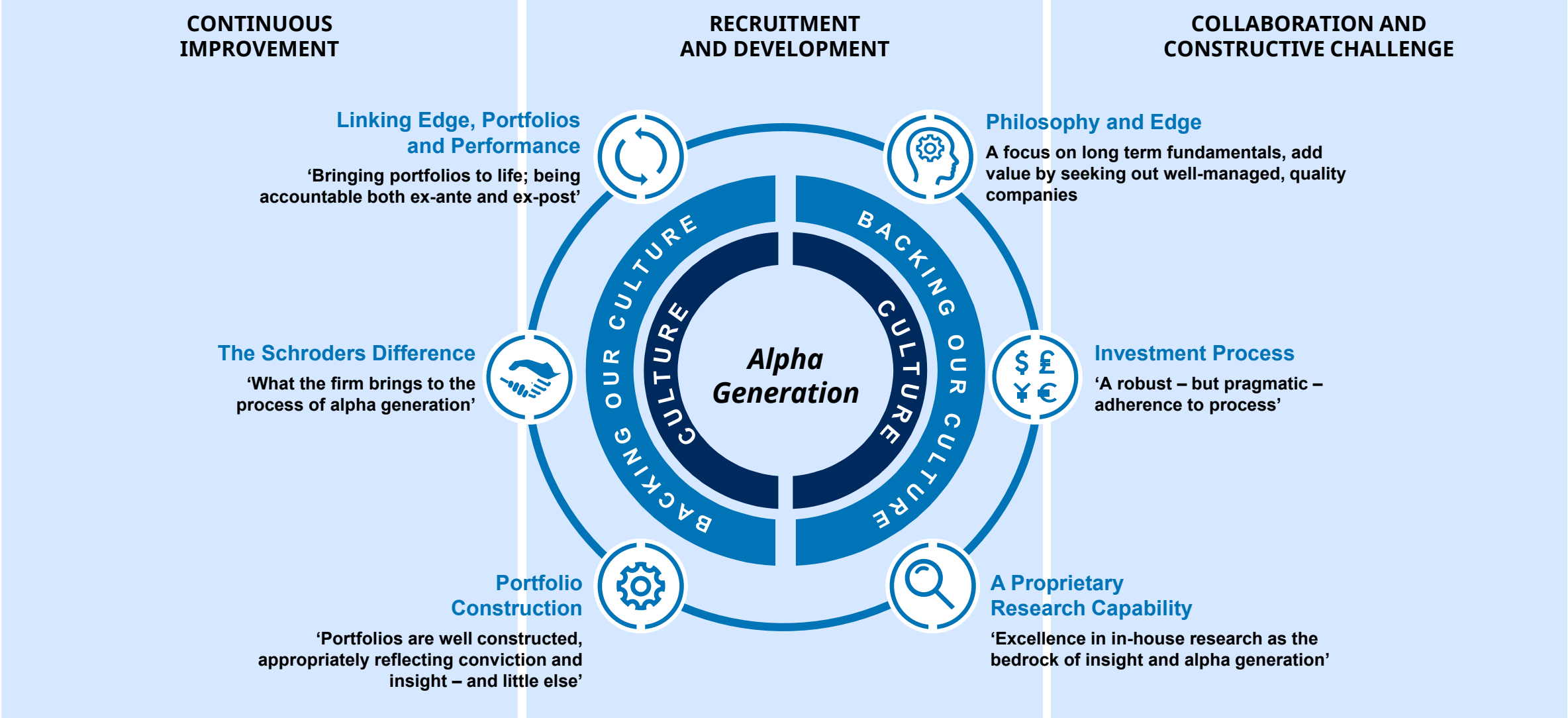
A worldwide team dedicated to asset management



Asset management is our core business and our goals are completely aligned with those of our clients – the creation of **long-term value** to assist them in meeting their future financial requirements. We manage on behalf of institutional and retail investors, financial institutions and high net worth clients from around the world, invested across **equities, fixed income, multi-asset, alternatives** and **real estate**.

Source: Schroders. Schroders firm assets include assets under management and administration as of June 30, 2018. Greater China equity assets as of March 31, 2019.

Why Schroders for China A-Shares?



Schroders



Schroders China Equities

Schroders Asian Equities

Strong regional and Greater China resources

- **49 Asia Pacific ex Japan fund managers and analysts¹** based in seven offices conduct more than 2,800 company visits per year² across the Asia Pacific region
- The Greater China equity team is headed by **Louisa Lo**, and is comprised of 20 other members from the above-mentioned Asian equities team
- Total Asia Pacific ex Japan Equity AUM of about US \$47bn as of March 31, 2019. **Greater China equities is a significant part of our business, and is about US\$13bn of total Asian equities AUM**
- Our **Greater China suite of products spans several successful strategies**, including Greater China, Hong Kong, offshore as well as domestic onshore China equities

Schroders offices

Tokyo

Opened 1974

Seoul

Opened 1987

Beijing

Opened 1996

Mumbai³

Opened 2012

Taipei

Opened 1989

Shanghai

Opened 1994

Hong Kong

Opened 1971

Singapore

Opened 1977

Jakarta

Opened 1991

Sydney

Opened 1963

Melbourne

Opened 2007



Investment office



Representative office

Source: Schroders, as of April 2019.

¹Including Schroders' local specialist team of nine equity analysts in Sydney, as well as a joint-venture team of six Indian equity analysts at Axis Asset Management (Axis AMC) in Mumbai.

²For the year 2018.

³A joint venture fund management company Axis Asset Management Company. Axis is not accessible to US investors and is shown only for illustration

An experienced, stable China investment team

Cohesiveness underpins team approach to drive long-term alpha generation

Schroders China Fund Management Team

Louisa Lo – Lead Fund Manager (HK)

Deputy Head of Asia ex Japan Equities, Head of Greater China Equities, 26 years investment experience, 23 years with Schroders

Hong Kong / China Equity Fund Managers

Toby Hudson

27 years of investment experience
27 years with Schroders
Located in Hong Kong

Amelia Wong

20 years of investment experience
12 years with Schroders
Located in Hong Kong

Maggie Zheng

18 years of investment experience
5 years with Schroders
Located in Hong Kong

Jack Lee

20 years of investment experience
7 years with Schroders
Located in Shanghai

Schroders China Equity Research

Raymond Maguire – Head of Asian Equity Research 22 years of investment experience, 4 years with Schroders

Financials

Sherry Lin
(25yrs/9yrs)
Jay Luong
(19yrs/11yrs)

Healthcare

Wei Li
Pharmaceutical
(8yr/1yr)

Real Estate/ Conglomerates/ Telcos

Alice LIU
(9yrs/<1yr)

Industrials/ Utilities/ Energy

Maurien Yau
(27yrs/15yrs)
Kelly Zhang
(8yrs/4yrs)
Sameer Kakakhel
Energy and Materials
(24yrs/8yrs)
Nina Yan
Deep Cyclical
(11yrs/1yr)

Technology

Chen Hsiu Chen
Technology Hardware
(21yrs/20yrs)
Ashley Chung
Technology component
supply chain
(13yr/1yr)
Jose Pun
Technology
(9yrs/1yr)

Consumption services and leisure

Sarah Liu
(13yrs/5yrs)
Candice Chen
(6yrs/2yr)
Ce Liu
(8yrs/1yr)
Maggie Li
(6yrs/6yrs)

Hong Kong – 9 analysts
Shanghai – 5 analysts
Taipei – 1 analyst
Singapore – 1 analyst

Biography

Lead Investment Professional

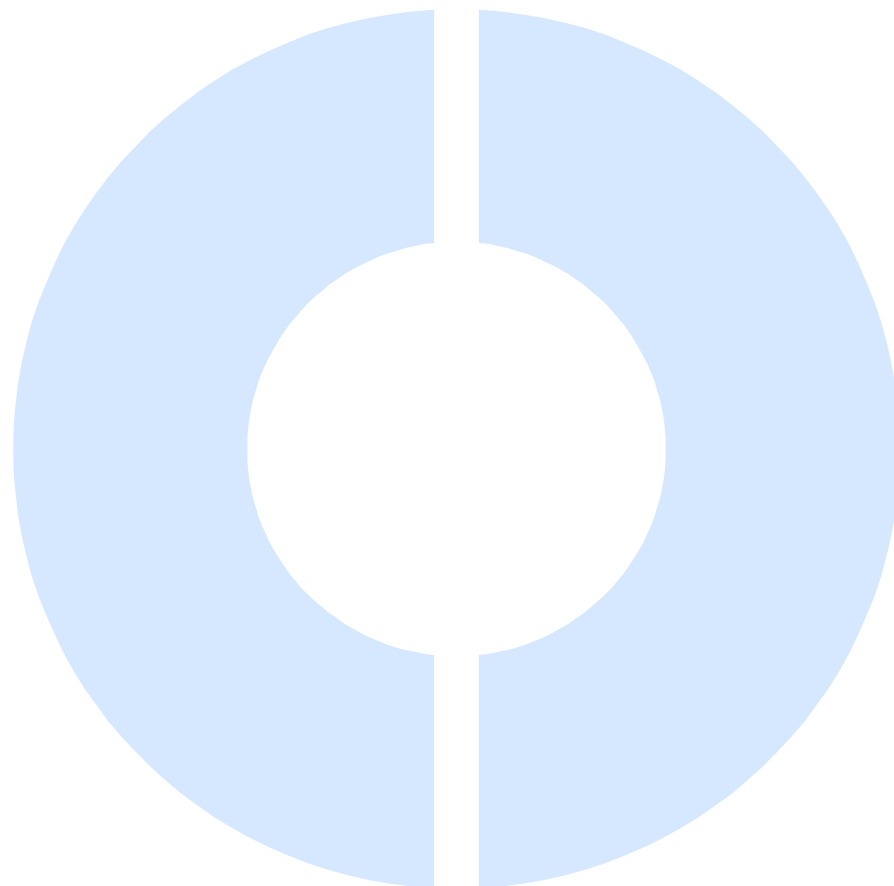


Jack Lee, CFA
Lead Portfolio Manager
Head of China A-Share Research
Based in Shanghai, China

- 20 years of investment experience
- 7 years with Schroders
- Jack joined Schroders from Huatai-Pinebridge Fund Management where he was the Head of Global Investment responsible for QFII and QDII investments. Prior to this, from 2007 to 2009, Jack was a Portfolio Manager at Abu Dhabi Investment Authority managing Hong Kong, China and QFII portfolios. Earlier, Jack was a Central Dealer and Senior Investment Analyst at AIG Global Investment Corp (Asia) (from 1999 to 2004), before transferring over to AIG-Huatai Fund Management as an Investment Manager (from 2004 to 2007). Jack's investment career began in 1998 at Tai Fook Securities. Jack is a CFA charterholder, ACCA (final stage) and holds Bachelor of Business Administration (Accounting), Chinese University of Hong Kong.

Source: Schroders, as of March 2019.

Schroders



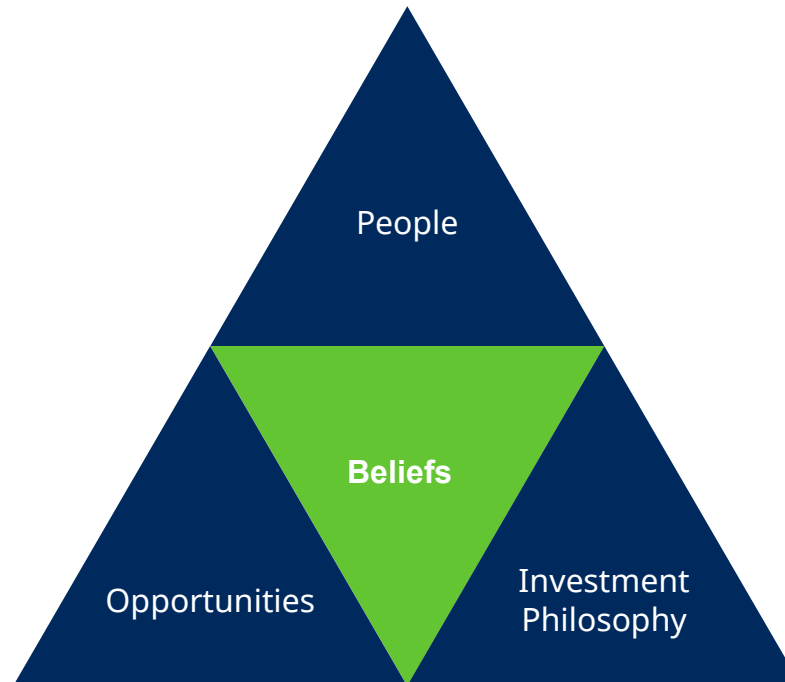
Investment Philosophy and Process

Core beliefs

How we add value

- **Investment Discipline:** Key to effective long-term stock analysis and portfolio construction
- **Local Asian team:** Information advantage derived from the quality and breadth of the team
- **Team stability:** Long established working relationship ensures sharing of best ideas across team

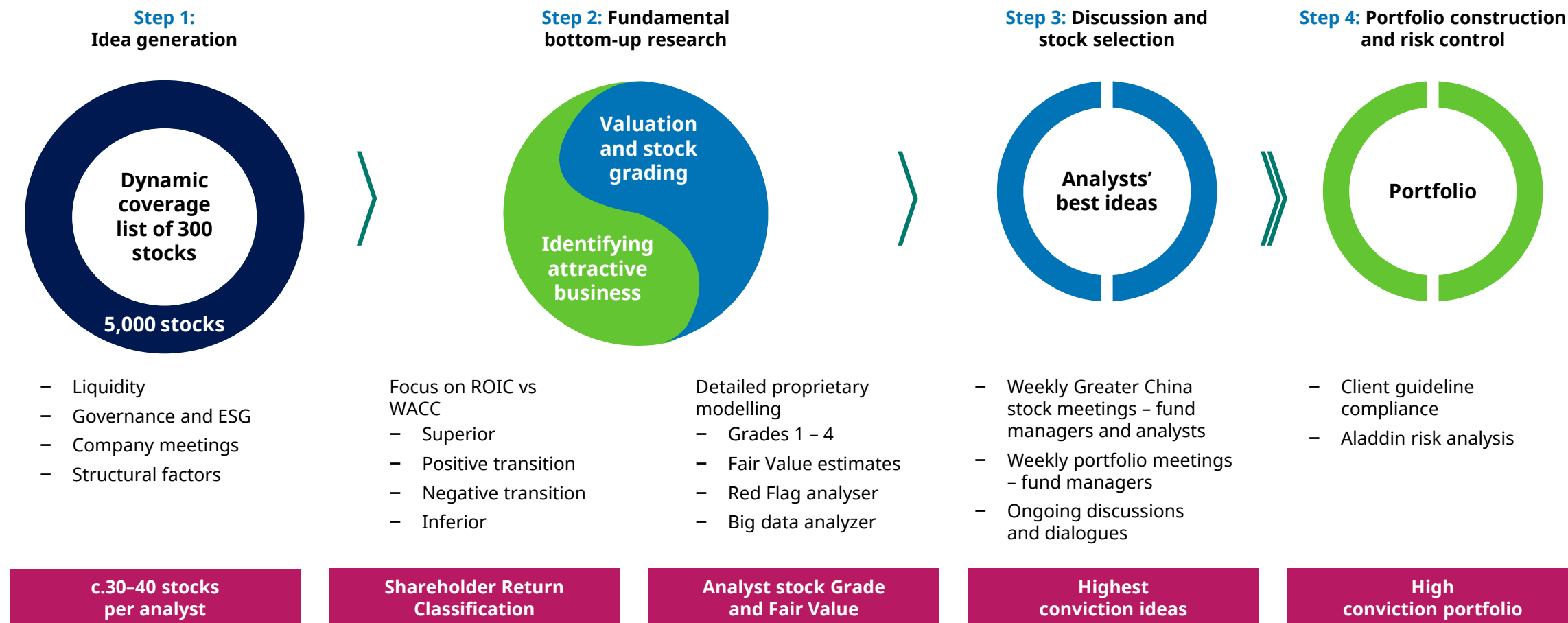
- **Asian markets are inefficient and volatile:** Volatility creates opportunities to add value
- **Understanding the Fair Value of stocks is key to realizing these opportunities**



- **Economic growth ≠ Stock market returns:** Picking quality companies adds most value
- **Focus on companies that deliver a superior return on capital over long term:** Focus on ROIC Vs WACC
- **Mid and small caps:** Attractive, under-researched investment opportunities
- **Governance is key:** Invest in companies where our interests are aligned with controlling shareholders

Investment process

Simple, disciplined and repeatable process



Source: Schroders.

The Schroder advantage



Combining superior resources and tools with a strong client focus on pursuing sustained outperformance.

The views and opinions stated in this document are those of the Greater China Team and are subject to change.

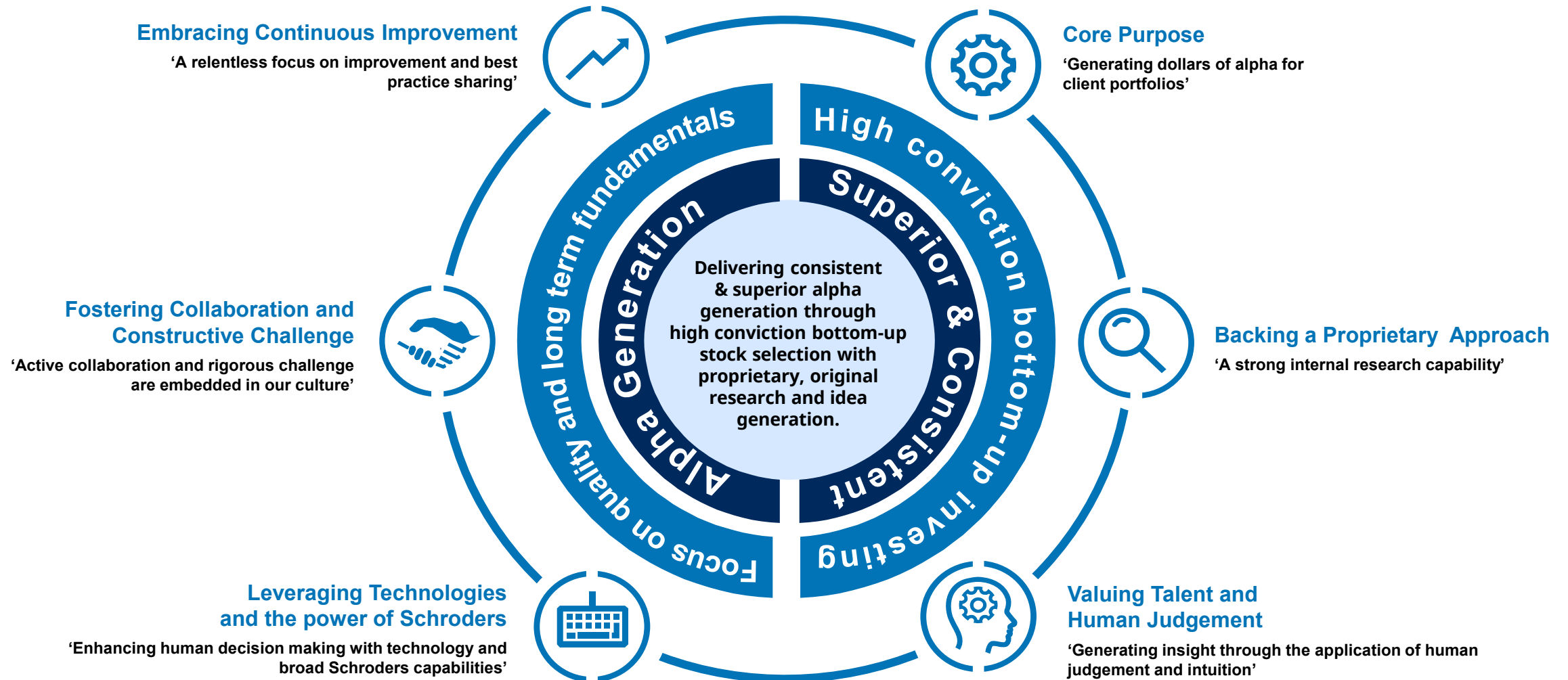
Schroders



Schroder Research - China

The research cycle

Asia ex-Japan Equity Research

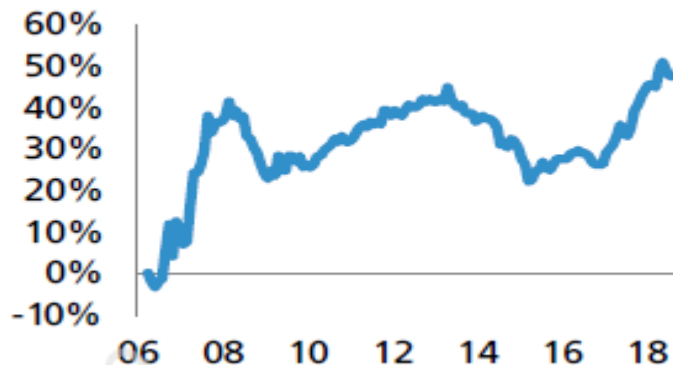


Does investing in China A require a different process?

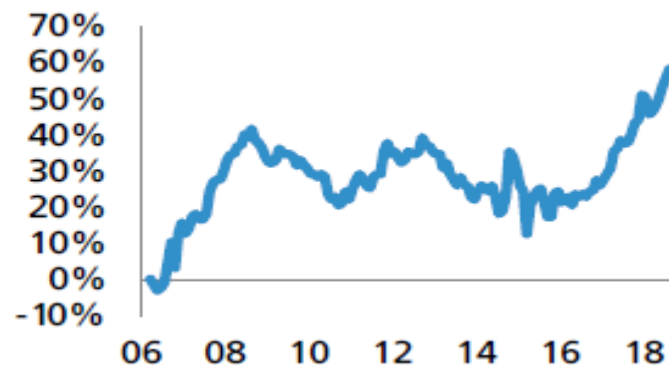
The answer to this is a definitive 'No'

- **Active management is key;** 80% of the A-share market are SOEs, where corporate governance is often poor, 'national service' and the resultant misallocation of capital frequent, with drivers based on government policy.
- **Assessment of management & corporate governance is absolutely critical.** Our forensic accounting model offers key insights in analysing 'red flags'; HK/ China markets have the highest red flag account relative to any other major market globally.
- The market has changed in the last 3 years with the introduction of 'Connect'. The maturing of the market and increasing inflow of institutional capital **has seen a shift from price momentum/ reversal strategies to a flight to quality & fundamentals i.e. more aligned with our investment process.** This will only continue, just as it did in Korea & Taiwan 20 years ago.
- **We invest by assessing the long term fundamentals of a company, not on a short term 'information edge'.** This aligns us with Schroder core values, high compliance standards and a proven alpha generating process.

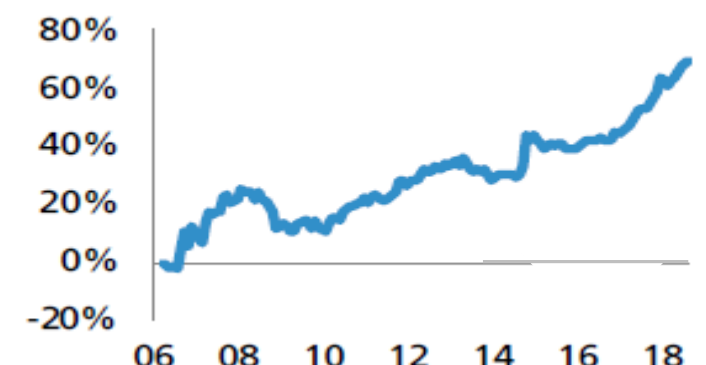
China A: cumulative returns of High RoE stocks



China A: cumulative returns of High Div Yield stocks



China A: cumulative returns of High EPS Revisions



Source: Schroders, UBS, November 2018.

Investment process

Deep dive fundamental research

China Jushi Co Ltd (600176.SS)

Schroders

Equity Research

Candice Chen, 02 May 2018

Share Price	14.07 CNY	SIM Holding	0.05%	Market Cap(USD)	6.3bn
Market Grade	2	SRC	Transitioning positive	Model Date	26 Apr 2018
Fair Value	16.20 CNY	FV Premium/(Discount)	13.9%	Previous FV	n.a.

Why do we fundamentally like/ dislike this stock: Like: 1) the fiberglass sector is in upcycle with diminishing cyclicity due to more diversified downstream application; 2) Jushi is already the leader with 20% global market share and continues to gain market share; 3) proven strong cost saving capability, which is most critical in a cyclical industry; 4) positive FCF yield and expected to rise to 5%. Dislike: 1) fiberglass is still a commodity and has to go through cycles; 2) the uncertainties from business merger with Taishan (yet could be +ve, benefiting from increasing economy of scale and monopoly power); 3) consensus sellside buy (17 analysts) with fairly bullish assumptions while I am 4-16% below the market for FY18-20e; 4) 50% revenue from overseas, which is exposed to trade war risk; 5) high environmental risk due to large consumption of energy (1/3 of COGS)

What's changed: initiation

Fair value & methodology: FV Rmb16.2/sh, based on 17.5x FY18e PE, which is 15% above historical average, as the sector is in the upcycle. The FV is supported by DCF value of Rmb16.4. The stock is trading at 14.5x FY18e PE, which is 5% below historical average.

Grade & SRC, rationale: Grade 2, ROIC transitioning positive

Asymmetric risk: 1) Bull case: if gross margin expansion trend is to continue, FY18e EPS could increase to Rmb0.98 [+7%] and PE rerates to 19.0x because of higher than expected growth. FV will be Rmb18.6; 2) Bear case: if volume growth falls to 8% (sector average) and gross margin contraction happens, 2018e EPS could fall to Rmb0.84 [-9%] and PE derates to 13.0x. FV will be Rmb11.0

Catalyst & Key Risks: 1) global economy enters into down cycle; 2) new capacity addition faster than expected, changing the D-S landscape thus lowering ASP; 3) raw material cost hike and inability to fully pass through, leading to gross margin contraction; 4) Sino-US trade war will influence market sentiments; 5) the substitution of other materials is slower than anticipated; 6) the merger with Taishan creates some uncertainties

Red Flags & ESG: No material ESG issues. Jushi appears to be an SOE, as CNBM (3323 HK) is the largest shareholder with 27% ownership. However, it is essentially a private firm run by Mr Zhang Yuqiang, who controls 16% of stake via Zhenshi Group. I think its corporate culture is quite market oriented, demonstrated by 1) emphasis on cost saving as critical KPI; 2) advanced thinking on global strategy to deal with international trade conflicts. The environmental risk is higher due to large consumption of gas and electricity (1/3 of COGS) in the manufacturing process.

ZTO Express Cayman Inc (ZTO.N)

Schroders

Equity Research

Maurien Yau, 10 May 2018

Share Price	17.06 USD	SIM Holding		Market Cap(USD)	12.42 b
Market Grade	2	SRC	Superior	Model Date	10 May 2018
Fair Value	19.50 USD	FV Premium/(Discount)	14.30%	Previous FV	19.5 USD

	Schroders EPS		Cons EPS		SDR vs Cons	EPS Revision	Sales Growth	EBIT Margin	Valuation				
	EPS	Growth	EPS	Growth					PE	EV EBITDA	FCF Yield	Div Yield	PBV
FY0	4.47	47.2%	0.66	46.7%	0%	0.00%	33.4%	30.0%	24.3x	15.0x	2.6%	1.2%	3.6x
FY1	4.45	-0.5%	0.90	36.4%	-21%	-13.76%	41.0%	23.0%	24.4x	14.8x	0.0%	0.0%	3.2x
FY2	5.88	32.2%	1.12	24.4%	-14%	-8.87%	25.8%	24.7%	18.5x	10.7x	3.4%	0.0%	2.7x
FY3	7.12	21.1%	1.32	17.9%	-13%	-5.47%	18.8%	25.2%	15.3x	8.4x	4.8%	0.0%	2.3x

Why do we fundamentally like/ dislike this stock: Like: a solid track record, stable franchisees network and strong cash flows. Dislike: higher capex needed and dilute ROIC

What's changed: SIM earnings cut by 14% / 9% for 2018/19 after gauging 2017 and 1Q18 results. I now forecast 17% earnings CAGR in 2017-20.

Fair value & methodology: DCF, assuming 7.8% WACC, long term EBIT margin to converge with the global asset light peers, decelerating EBIT growth from 24% CAGR (2018-20) to 8% (2021-31) and -2% (2032-43); higher capex needs from 2020 onwards.

Grade & SRC, rationale: Grade 2 unchanged. Despite declining ROIC and margin profile, I think ZTO is mispriced versus its DCF value. Judging from market expectation of ~20% earnings growth and IPO price at US\$19.5, I believe the current share price has not fully factored in such earnings profile.

Asymmetric risk: Upside 2018 DCF to US\$24 assuming higher EBIT CAGR (2021-31) to 10%; downside DCF to US\$10.4 if growth collapses to 3.6% - i.e. a similar level as the potential long term GDP growth.

Key Risks to Thesis: Deeper ASP cut by ZTO for even bigger market share targets. Rise in labour costs that either ZTO has to increase subsidies to franchisees or services being compromised. Higher than expected capex in the long term.

Red Flags & ESG: ZTO has poor rating and high accounting risk rating in GMT RF. I think this is mainly because the listed ZTO only captures the transit (and arguably the most profitable) part of the whole logistic chain and that majority of the first and last miles delivery business is handled by its franchisees. The VIE structure of ZTO also means low transparency of the operation. And its asset light model and new capital from IPO also make some financial ratios look unusual. But booking the acquired franchisees before IPO as goodwill is unusual and can help avoiding amortisation expenses. For ESG, internalising environmental costs (e.g. use of more expensive recycling materials) and labour costs (e.g. normalise social benefits for staffs hired by franchisees) may increase the operating costs of ZTO.

For illustrative purposes only.

Investment process

Fundamental bottom-up research: detailed financial modelling drives dialogue with company management

NETEASE INC-ADR										Country: CHINA		Fair Value: 320.0 +14.3%		Grading: 2	
Internet Software & Services										Analyst: Jing Li		Modelled: Mar-17		Superior	
Results	Fiscal Yr	M Cap US\$	ADTV\$	Price	P/E	5d	1m	6m	12m	Revenue	-1YR	-3YR	-5YR	Est CAGR	
17052017	3/12/2017	36.735	368.1	279.9	Block	3.9	3.2	5.1	7.2	Revenue	67.4%	60.7%	39.3%	19.5%	
17052017	3/12/2017	36.735	368.1	279.9	Block	3.9	3.2	5.1	7.2	Revenue	67.4%	60.7%	39.3%	19.5%	
17052017	3/12/2017	36.735	368.1	279.9	Block	3.9	3.2	5.1	7.2	Revenue	67.4%	60.7%	39.3%	19.5%	
* based versus total universe of ~2000 stocks (HIGH SCORE = POSITIVE, except Accounting Red Flags)															

Recommendation Grade with absolute FV upside

Equal focus on

- Profitability, growth, FCF generation, cash conversion cycles, dividends...
- Balance-sheet & credit checks

How are we different from the market?

Assessment of consensus move in earnings

Is there positive or negative asymmetric risk? Upside/Downside scenario analysis

Proprietary risk assessment: analysing red flags

Smart screening & benchmarking

Investment process

Pivotal Questions... analysis of the big issues

Pivotal Question

Sameer Kakakhel & Candice Chen April 2018

Pivotal Question: What is the growth outlook for the Electric vehicles (EV)? How will the component supply chain evolve and how to play it in AXJ equities?

Industry impacted: Lithium Battery Cell/Pack makers, Component Chain (Cathode, Anode, Separator, Electrolyte), Auto OEM's

Key conclusions: **Stocks impacted/ Actionable ideas:** Lithium Ion Battery (LIB) technology, for at least the next 5 years, is likely to be the preferred format for electrified propulsion. From just \$13bn in 2017 (already larger than consumer LIB), EV LIB is on track to be

a \$50bn revenue market by 2025 and over \$100bn by 2030 (see our discussion here). Thanks to generous subsidies and Govt. support, China's EV market is growing rapidly (1.2mn; ex non plug-in hybrids) and LIB (~600k units) is also growing.

China players are quite different over next 2-3 years. CATL (IPO Expected 2018), Guoxuan (OO2018), and others are under margin pressure from falling subsidies and rising costs. They will not catch up with demand. This oversupply will not be a problem as battery cells are becoming a commodity (and are being replaced by select equipment suppliers and niche components).

of the world (mainly Korea/Japan) provided the technology. CATL (IPO Expected 2018), Guoxuan (OO2018), and others are under margin pressure from falling subsidies and rising costs. They will not catch up with demand. This oversupply will not be a problem as battery cells are becoming a commodity (and are being replaced by select equipment suppliers and niche components).

chain but 4 players are discussed in the notes. CATL (IPO Expected 2018), Guoxuan (OO2018), and others are under margin pressure from falling subsidies and rising costs. They will not catch up with demand. This oversupply will not be a problem as battery cells are becoming a commodity (and are being replaced by select equipment suppliers and niche components).

China, key stocks are tier 1 battery makers LG Chem, Panasonic, and CATL. CATL (IPO Expected 2018), Guoxuan (OO2018), and others are under margin pressure from falling subsidies and rising costs. They will not catch up with demand. This oversupply will not be a problem as battery cells are becoming a commodity (and are being replaced by select equipment suppliers and niche components).

Watch list: EV Penetration rates China/ROV, battery technology and OEM intent

Key Risk to Thesis: 1) EV penetration rates China/ROV, battery technology and OEM intent

oversupply in the entire LIB chain depressing prices. Govt. withdrawing subsidy support too soon

materials e.g. cobalt or c) Lower than expected EV penetration (in the next 2-3 years) in battery

industry especially the components 3) Breakthrough in the next 2-3 years) in battery

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Pivotal Question

Pivotal Question: How have Chinese banks grow their assets in the past ten years and what implications does this have for China's monetary policy going forward?

Industry / Country impacted: Chinese banks, China's monetary policy

Key conclusions: China's credit fuelled growth that started in 2009 has its ninth year running in 2017. Credit vs. nominal GDP continues to build up, we have seen for the first year in 2017 some

thanks to the government's focus on financial de-leveraging since 4Q16. This massive increase in credit is an issue for banks to warehouse credit given various regulatory constraints (LDR cap, loan quota, capital adequacy ratio, etc.).

result is an interesting change over years of the bank's asset structure on balance sheet as well as the balance sheet exposure (i.e. WMPs). This note puts these into perspective looking at the trend over the past ten years.

The message to take home is that most Chinese banks are operating with a much higher liquidity ratio than banks outside of the big four. The macro implication is that current monetary policy (neutral to tight) is much longer and any change will be marginal and serves only the purpose of reducing liquidity.

announcement of a targeted RRR cut over the weekend is the classic example in sight. At the bar, the announcement of a targeted RRR cut over the weekend is the classic example in sight. At the bar, the announcement of a targeted RRR cut over the weekend is the classic example in sight.

continue to screen better whilst CMB is the most aggressive in housing potential credit exposure

Stocks impacted/ Actionable ideas: The big four banks remain the safer exposure to hold and among them, CCB (the only two with "2" grade) continue to have the strongest capital buffer that I will continue to hold.

bank shares have reacted very positively toward the targeted RRR cuts announcement over the weekend. This should not, be read as a shift in monetary policy, in my view.

Watch list: CCB, ICBC, ABC, BOC, CMB.

Schroders
Equity Research

Sherry Lin, 3 October 2017

Schroders

Equity Research

5 July 2018

Maurien Yau / Sameer Kakakhel

Pivotal Question

Pivotal Question: Where is China in its "War" on pollution and how to play it?

Industry/ Country impacted: Wide impact including Steel, Coal, Chemicals (Plastics, Caustic...), Paper and multifaceted impact of the shifting energy pie including rise of natural gas and renewable's (New Energy vehicles chain has been discussed in a separate note).

Key conclusions: Just 3 years ago, Chinese authorities flatly denied US embassy readings of dismal Beijing air quality and yet the same readings were prominently posted in the breakfast area of the hotel we stayed in. This simple anecdote shows how rapidly the mood in China has changed in facing the environmental challenge. The regulatory framework was in place from early 2017, but the strong language used by President Xi at the party congress led to the harsh winter production cuts in 26+2 cities (Beijing-Tianjin-Hebei triangle). Major takeaway from our visit is that these rules are being tightened further not eased e.g. 'steel capital of the world' Tangshan has given a deadline of Oct 18 for its steel players to switch ultra-low emissions which is much earlier than expected. A new rumour during our recent visit was that, following Tianjin in September 2017, Bohai region may also ban coal trucking in September 2018. Yet two key points to bear in mind a) China clean-up is not a new story so far upside to equity prices the impact has to be larger than expected and/or structural in nature b) The upturn in demand has likely exaggerated the impact which could mean near term risks e.g. ban on waste plastic and paper imports helping apparent domestic demand. To frame the discussion, let's divide the sectors into those with a supply glut and where China is still short.

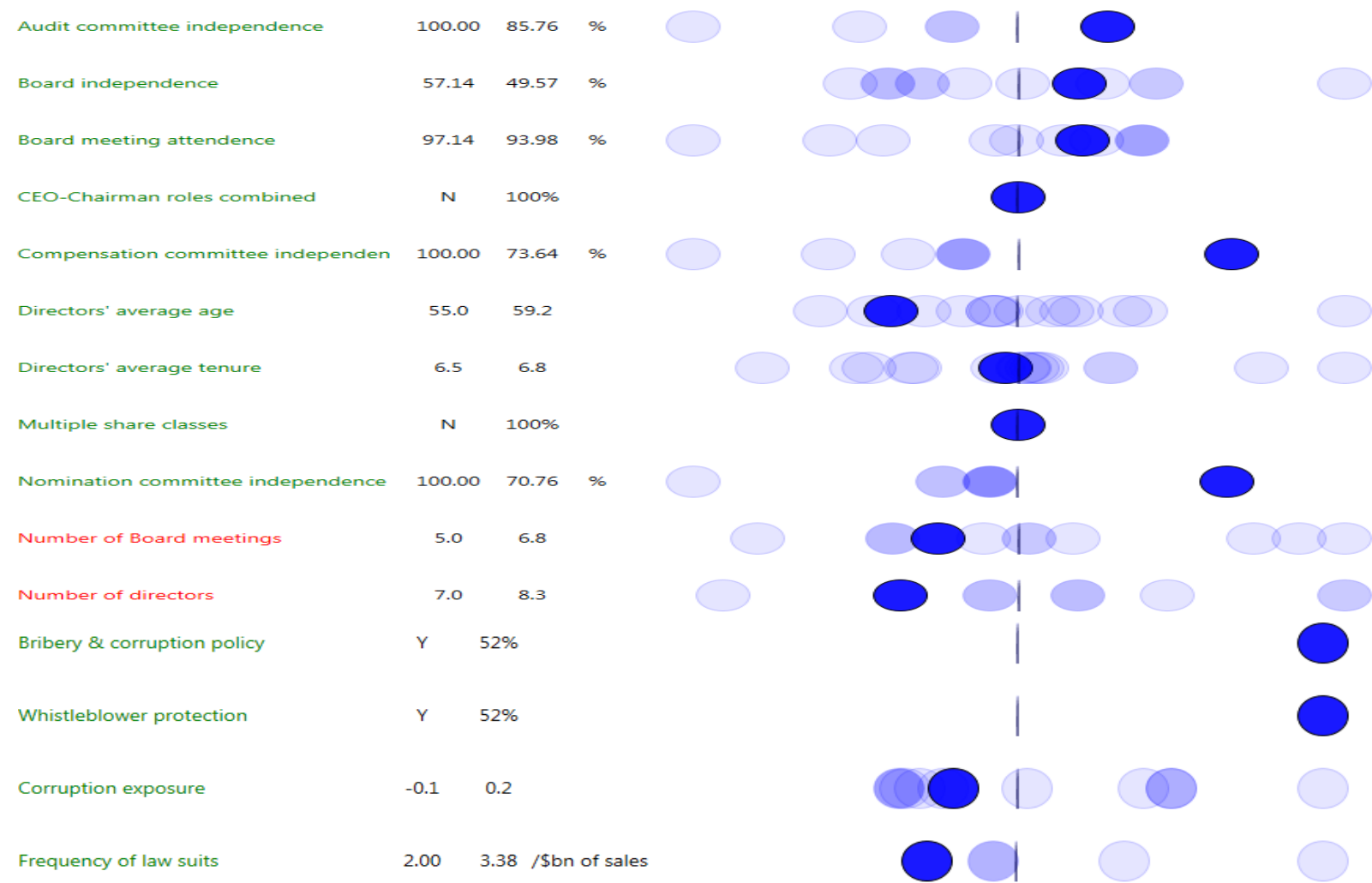
China surplus industries - steel, cement, paper, PVC/Caustic soda, Aluminium/Bauxite Mining, Coal, Urea, Glass

Inefficient/illegal capacity shutdown along with curbs on production is helping reduce total supply and restoring some degree of pricing power. Larger local and global producers gain vs as advantage to scale and technology rises. Most of these players were focusing on top line growth and regularly destroyed value. Steel, glass and paper industries were in persistent surplus but balances and returns have seen a sizable positive shift which is likely to continue at least near term.

China shortage industries - Natural gas (E&P), LNG, Plastic (PE), copper, EV supply chain, railway freight transport & gas equipment

We're dedicated to thoughtful, deep-dive analysis

So what can the Quants not do?



Corporate Governance

A key cornerstone to our investment process

- 1 We have yet to see a credible third party data source for assessing & ranking ESG factors.
- 2 Data analytics can be of use in assessing the 'E' & 'S', *if* there is data...
But it clearly fails on the 'G'
- 3 Fundamentals & grey hair still required !

Investment process

Red flag analysis

Short Name	Shengyi Tech C-A	Description:	Relevant GMT Research Reports (please go to our website and login):
GICS Ind Name	Electronic Equipment, Instruments & C	Shengyi Technology Co.,Ltd. manufactures and markets electronic components. The Company produces include copper clad plates, insulating laminated sheets, double sided circuit boards, high multilayer circuit boards, and other products. Shengyi Technology also operates house loans.	
GICS Industry	452,030		
Cntry of Dom	CN		
Most Recent Balance Sheet Period	2019 Q1		
Ticker	600183 CH		
Latest Period	Yes		
Current Fiscal Year	2018		
Small auditor:	Gp Cpa		
Number of auditors in past 5yrs:	1		
Country of incorporation:	Country of incorporation (China) is same as domicile (China).		
Country of financials:	Currency of financials (Yuan Renminbi) is same as country of risk (China).		
Able to short sell?:	Yes		
Profit Manipulation		Latest financials complete	
Profit Manipulation: Beneish M-Score (See App 1)	Global Screen	Beneish M-Score of -2.12 in Yes/FY18 suggests possible profit manipulation triggered by: Deteriorating asset quality. Falling depreciation. Rising SG&A.	
Cooking the Books: Montier's C-Score (App 2)		A C-Score of 1/6 implies improving financials and unlikely manipulating profit.	
Financial Position			
Strength of Financial Position: Piotroski F-Score (App 3)		An F-Score of 6/9 suggests financials are improving.	
Risk of Default: Altman Z-Score (App 4)		An Altman Z-Score of 7.99 is in the Safe Zone: Financially sound.	
Accounting Shenanigans			
Acquisition Accounting (App 5)	Global screen	No evidence of acquisition accounting.	
Window Dressing (App 6)		Possible debt window dressing owing to high debt churn and a high effective interest rate in FY13 FY14 FY15 FY16 FY17 Yes/FY18 No evidence of investment window dressing.	
Fake Cash Fraud: Overly profitable (App 7)	Global screen	Scores 1/4 in Yes/FY18. Minor Fraud Alert: 98% of frauds have these characteristics but so do 36% of all companies. Triggered Fake Cash Flow in last 5yrs?: None	
Excess Capital Raising (App 8)	Global screen	Net flows over 5yrs at 3% of Sales are normal.	
Debt Reconciliation (App 9)	Global screen	No material unreconcilable changes in debt in the last 5 years.	
Other Financial Items			
Number of Red Flags (Out of a possible 75)		Triggers 9 red flags in the last financial period which is low.	
Cash Balance		Cash & STI of CNY1.2bn is within normal range.	
Restricted Cash		Restricted Cash of CNY0bn is within normal range.	
Receivables		Large Receivables of CNY4.6bn are equal to 38% of Sales which is in the 92%ile relative to peers, can be a sign of channel stuffing.	
Doubtful Debts		Delinquency at 0% of total receivables are within normal range.	
Payables		Large Payables of CNY2.3bn equal to 20% of Sales are in the 80%ile relative to peers, can be a sign of hidden debt.	
Inventory		Inventories of CNY1.7bn are equal to 15% of Sales which is within normal range.	
Profit Manipulation: Gross Working Capital		No evidence of profit/cash flow manipulation through working capital.	
Cash Extraction Fraud: Prepaid Expenses		No evidence of illegal cash extraction fraud.	
Capitalisation of Expenses		Capitalised expenses relative to pre-tax profits (0%) are within normal range.	
Affiliate Investments		Investments in Associates of CNY0.3bn are equal to 4% of equity and 2% of OP, within normal range.	
Auditing Costs		Auditing Expenses of 1bp of sales are unusually low in the 2%ile relative to peers, suggesting a poor audit.	
Deferred Tax Assets		Deferred Tax Assets/Sales of 0% are within normal range.	
Deferred Tax Liabilities		Deferred Tax Liabilities have increased by 1ppts relative to sales over the past year which suggests that profits reported to shareholders are higher than those reported to tax authorities.	
Derivatives		Derivatives equal to 0% of equity within normal range.	
Other Large Curious Assets and/or Liabilities		Within normal range.	
Depn & Amort		An extended Depreciation Schedule of 20.2 years suggest that the company might be inflating profit.	
Interest Cover		EBIT Interest Cover of 8.1x is within normal range.	
Leverage		Total Debt/Profit of 3.6x and assets to equity of 1.9x are within normal range.	
Related Party Fraud		No evidence of related party transactions.	
Non-Core Income		Within normal range.	
Other Tests:		No or new CFO.	

A framework for structured ESG analysis

What is material from an ESG/Sustainability/Stakeholder perspective – both positive and negative - and how does this impact your Grade, FV and long term ROIC trend?

ESG factors	Materiality of Risk	Trend	Comment
Material E & S risks	High Medium Low	↑↓↔	e.g. key issues of concern
Key Industry Environmental risks	High Medium Low	↑↓↔	e.g. regulatory risk (change of legislation, sugar/ carbon tax etc), air/ water/ soil pollution, high usage of water/ shortage etc.
Key Industry Social risks	High Medium Low	↑↓↔	e.g. employee related issues, risk to the brand (such as data security leakage, sourcing of food products/ raw materials, child labour etc)
What is the company doing to mitigate E risk?	High Medium Low	↑↓↔	e.g. include any historic examples of malpractice, and any resultant change to process/ policy. If no historics, what are the policies/processes/ targets in place?
What is the company doing to mitigate S risk?	High Medium Low	↑↓↔	e.g. include any historic examples of malpractice, and any resultant change to process/ policy. If no historics, what are the policies/processes/ targets in place?

Analyst remuneration tied to recommendations

Research team directly incentivized based on performance of grades

Stocks are graded 1 through 4

- 1 = Strong conviction stock will outperform the country
- 2 = Stocks expected to outperform
- 3 = Stocks expected to underperform
- 4 = Strong conviction stock will underperform the country

Bonus assessment for analysts

Quantitative (75%)

- 50% tied to performance of analyst grades
- 50% tied to portfolio impact

Qualitative (25%)

- Productivity
- Communication
- Conviction/Impact
- Teamwork

Schroders



Stock example

Stock example

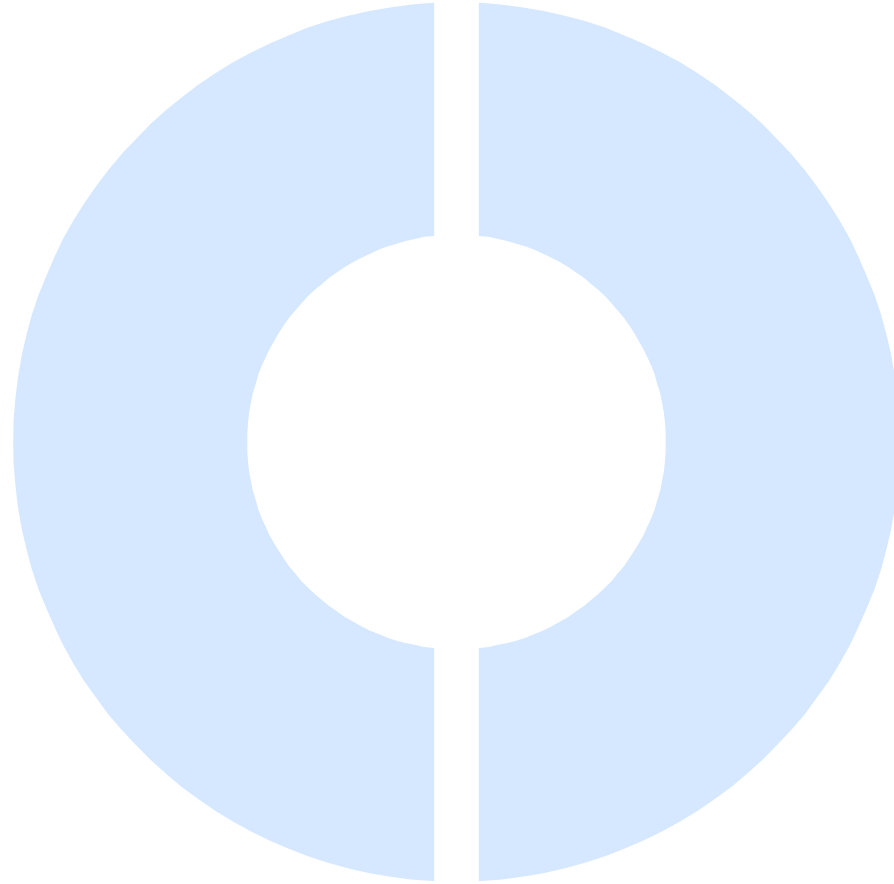
China International Travel Service

Shareholder Return Classification	Superior
Stock Grade	2

- Travel company with a monopoly as the single holder of a nation-wide license in China's booming duty-free market.
- Identified catalysts, including the appointment of professional management with industry experience, acquisitions and a turnaround in Hainan's tourism industry. Re-entered position as a positive transition idea.
- Currently, already the world's largest duty-free market, long term growth opportunity as China's duty-free sales expected to grow strongly alongside rising trends in disposable income and inbound/ outbound tourist travel.
- Favorable policies to retain duty-free demand in China in addition to international expansion could see CITS becoming the leading player in the global duty-free market.
- Stock has been re-classified as a Superior stock.



Source: Thomson Reuters, Schroders, January 2019. For illustrative purposes only. Not a recommendation to buy or sell any security. Past performance is no guarantee of future results.



China A-Share Strategy

Performance objectives and risk parameters

Investment objective	Achieve sustainable and long term capital appreciation in US dollars by investing primarily in the People's Republic of China (the "PRC") capital markets, mainly in securities of companies in the PRC securities markets
Investment universe	Primarily invest in A-shares of PRC companies directly via qualified foreign institutional investors ("QFII") or the Shanghai Hong Kong Stock/Shenzhen Hong Kong Stock Connect Scheme
Benchmark	MSCI China A Onshore Index ²
Performance target	Outperform benchmark by 3–4% (gross) over 3–5 years
Typical number of holdings	30–60 names
Tracking error	Between 5% and 12% (ex ante)
Stock limit guidelines	Benchmark +/- 7%, no limit on collective off-benchmark holdings
Sector limit guidelines	Benchmark +15%

Source: Schroders. All information is for reference only and subject to change. There can be no guarantee that any investment objectives can be achieved.

¹Effective March 1, 2018. Previously known as MSCI China A Index. CSI 300 index was the reference benchmark since inception to the October 31, 2017.

Performance summary

As of April 30, 2019

	3 months %	6 months %	1 year %	3 years %(p.a.)	5 years %(p.a.)	Since inception ² %(p.a.)
Schroder China Equity Alpha Fund I Acc (net) *	22.2	29.9	-1.8	14.5	20.6	14.7
Benchmark¹	22.7	31.1	-3.7	4.5	11.0	5.9
Relative performance	-0.5	-1.2	+1.9	+10.0	+9.7	+8.9

	2018 %	2017 %	2016 %	2015 %	2014 %
Schroder China Equity Alpha Fund I Acc (net)*	-24.0	44.1	-8.5	31.5	32.4
Benchmark¹	-33.0	27.8	-15.2	2.4	52.1
Valued Added	+9.1	+16.3	+6.8	+29.1	-19.8

*Net of 75bps management fee. Past performance is not a guide to future performance and may not be repeated

¹Effective November 1, 2017 MSCI China A Onshore replaced CSI 300 as the benchmark.

²Inception date: March 2, 2013.

Source: Schroders, bid-to-bid, income reinvestment, net return; Schroders China Equity Alpha Fund - Class I, US dollars, Acc. Inception date: March 8, 2013.

Please note that 100% of the provision CGT was released to Schroder China equity Alpha on December 18, 2015, the estimated adjustment is around +2.23% (on Class I).

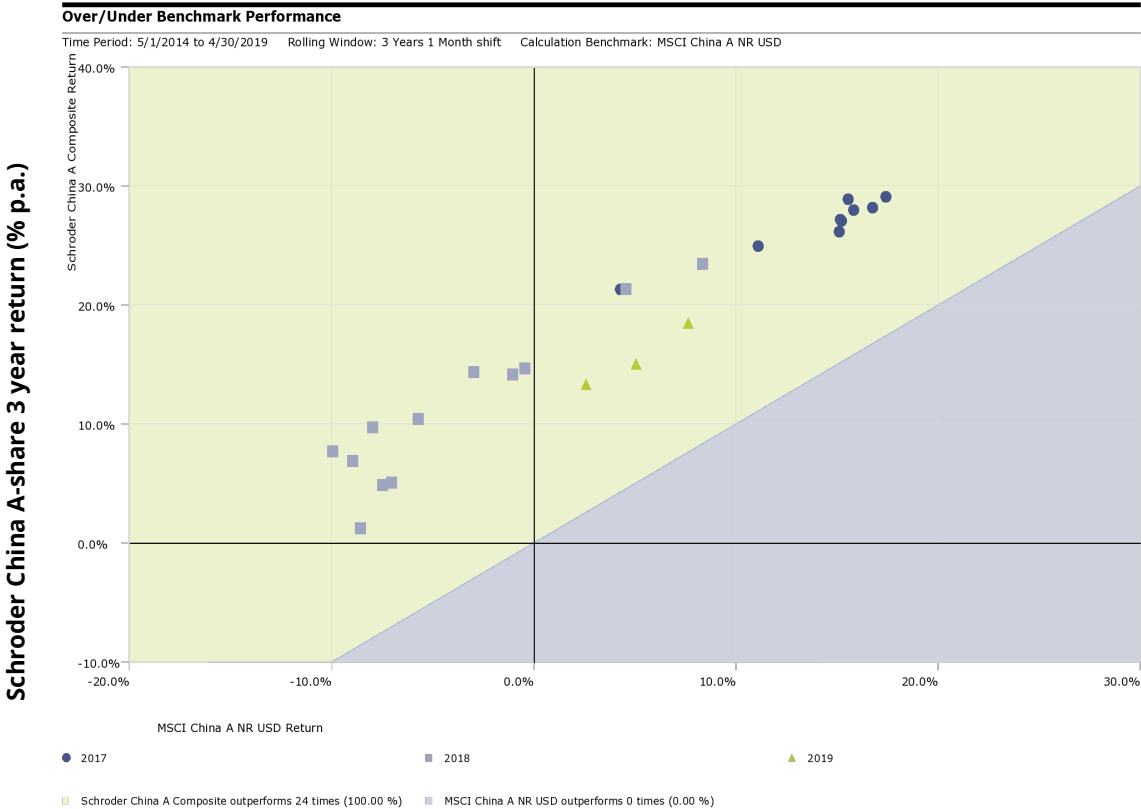
Performance

Hit rate and performance consistency

Hit rate – Since inception to March 31, 2019 (in US\$)

Months in which the index returned:	Number of months	Number of months Schroders outperformed index	Percentage of months Schroders outperformed index
More than 3%	24	10	42%
Between 0 and 3%	13	11	85%
Less than 0%	35	23	66%
Total	72	44	61%

Consistency of performance - Rolling 3 year period

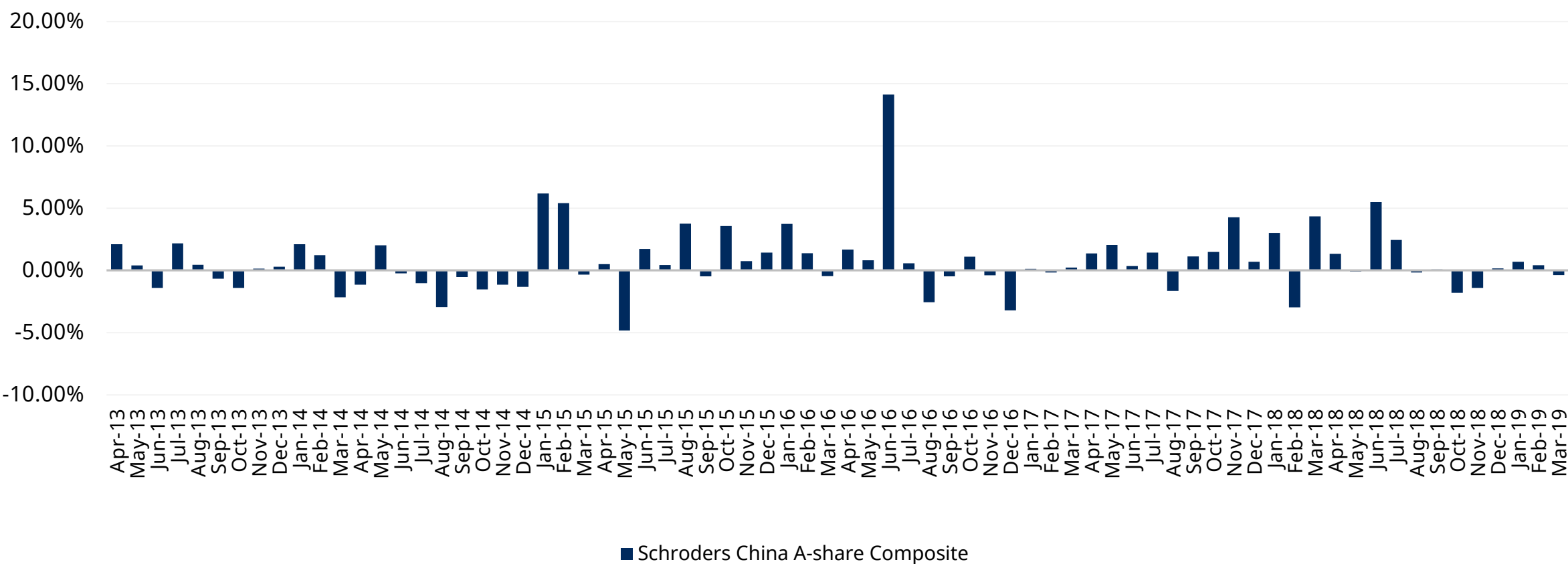


Source: Schroders, MSCI.

The chart compares each of the rolling 3 year annualized returns for Schroders China A-Shares (gross of fees) and the indicated index since the first 3 year performance using rolling monthly windows from April 1, 2013 (inception of the composite) through March 31, 2019. Performance shown represents past performance. Past performance is no guarantee of future results. See additional disclosure at the end of this presentation for important information.

Monthly performance since inception

Monthly excess returns of the Schroder China A-Shares Composite against the MSCI China A Net (TR) Index



44 out of the last 72 (61%) months have been positive

Past performance is not a guide to future performance. The value of investment can go down as well as up and is not guaranteed. Please refer to the Important Information slide showing the effect of fees. Please refer to the Composite Disclosure Statement at the end of the presentation for further details.

Source: Schroders. Data as of March 31, 2019. Monthly excess returns are based on the Schroder China A-Share Composite, against the MSCI China A net (TR) Index. Excess returns are stated gross of fees.

Schroder China A-Share - Investment Vehicle & Fee Proposal

Alaska Retirement Management Board

China A – Shares Mandate

FEATURES	No Embedded Management Fee – Institutional Mutual Fund*
Total/net expense ratio ¹	0.75%
12b-1	none
Other fees ²	none
Investment minimum	Negotiable
Client eligibility	Qualified retirement plans requiring management fees billed outside of NAV

10% Discount on International Small Cap Mandate

In addition, in recognition of a multiple product relationship, we would reduce your International Small Cap management fee, as follows:

Current Fee Schedule

On the first \$100 million 80bps
In excess of \$100 million 75bps

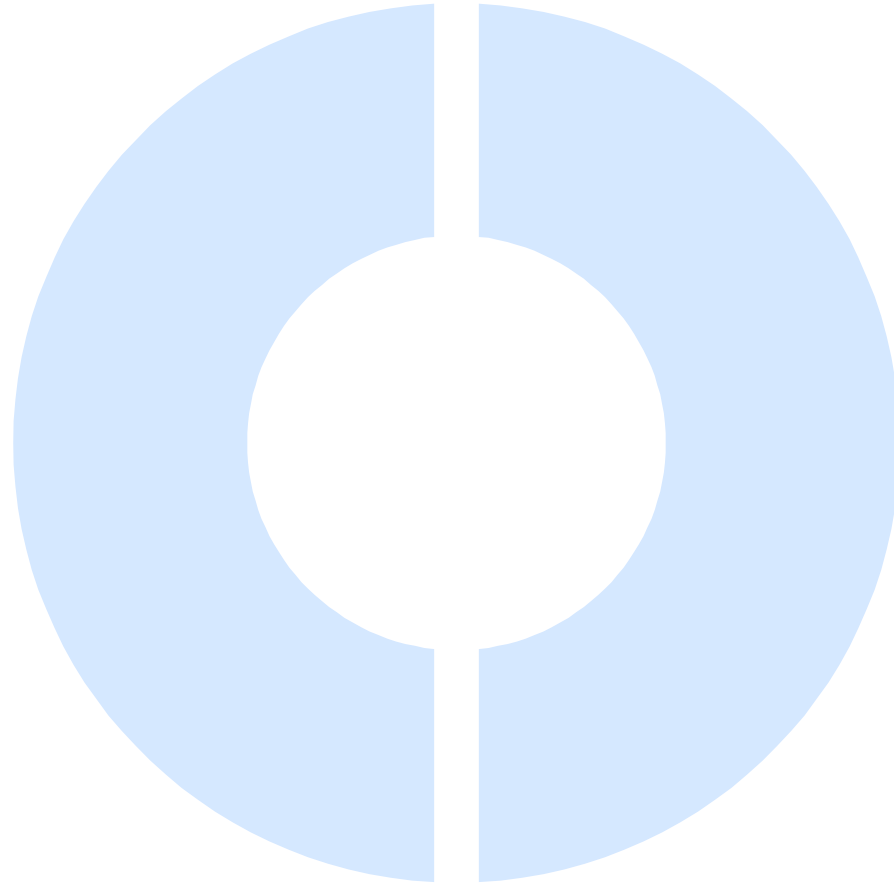
Multi-Product Discounted Fee Schedule

On the first \$100 million 72bps
In excess of \$100 million 67.5bps

Source: Schroders. For preliminary reference and due diligence, does not reflect any actual account. This material is not to be considered an offer to buy or sell any security or financial instrument. Intended only to illustrate the current investment capabilities of the China A-Shares Team. Please refer to the offering documents for complete information.

*This vehicle accepts DB and OPEB assets.

Schroders



Portfolio positioning

Asset allocation

As of April 30, 2019

Sector	Portfolio Weight (%)	Benchmark Weight (%)	Total
Communication Services	--	1.5	-1.5
Consumer Discretionary	22.5	9.9	12.6
Consumer Staples	11.1	11.1	-0.1
Energy	--	1.9	-1.9
Financials	19.2	30.6	-11.4
Banks	7.7	15.6	-7.9
Diversified Financials	2.9	7.4	-4.6
Insurance	8.6	7.6	1.0
Health Care	5.2	6.4	-1.2
Industrials	10.6	12.8	-2.2
Technology	12.9	9.8	3.1
Materials	11.8	8.2	3.7
Real Estate	1.4	5.3	-3.9
Utilities	--	2.4	-2.4
Cash & Others	5.4	--	5.4

 Key overweights  Key underweights

Source: Schroders, April 30, 2019. For illustrative purposes only based on a representative account. Composition is subject to change over time. The table above compares the sector allocation of the fund against the fund's benchmark as measured by stock market capitalization. The weights are subject to change and should not be viewed as an investment recommendation. The benchmark refers to the MSCI China A Index.

Major positions

As of April 30, 2019

Top 10 holdings

	Fund (%)
Ping An Insurance	7.7
Anhui Kouzi Distillery	5.3
Midea Group	4.2
Hangzhou Hikvision Digital Technology	4.0
Inner Mongolia Yili Industrial	3.2
AVIC Jonhon Optronics Technology	3.1
China Jushi	3.0
China Construction Bank	2.9
Industrial And Commercial Bank Of China	2.9
Huatai Securities	2.9

Source: Schroders, February 28, 2019. For illustrative purposes only based on a representative account. Composition is subject to change over time.

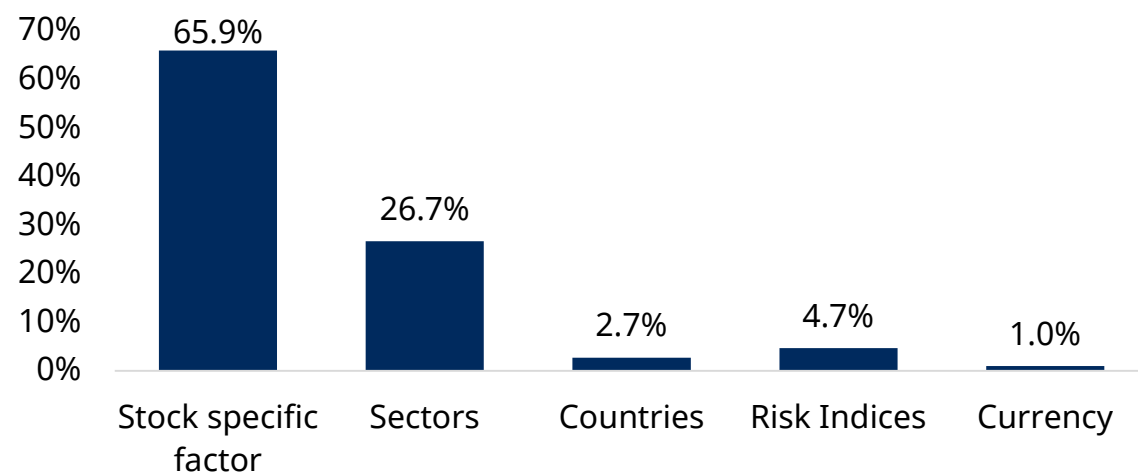
Portfolio analysis

As of April 30, 2019

Tracking error: 6.6%, Beta: 0.93

Characteristics	
Active share	80.1%
Benchmark coverage	19.9%
% of non-index stocks	32.8%

Active risk decomposition



Company	Contribution to Specific Risk (%)	Active Weight (%)
Anhui Kouzi Distillery	22.4	5.1
Shandong Sinocera Functional	3.5	2.6
Sungrow Power Supply	3.0	2.4
Btg Hotels	2.8	2.6
AVIC Jonhon Optronics	2.5	3.0
Hangzhou Hikvision	2.2	3.2
Skshu Paint	2.0	2.6
Songcheng Performance	2.0	2.1
Chongqing Zaisheng Tech	1.9	1.2
Anhui Zhongding Sealing Parts	1.7	2.4

Source: Schroders, Style Research. For illustrative purposes only based on a representative account. Composition is subject to change over time. Does not constitute any recommendation to invest or disinvest in the above-mentioned securities.

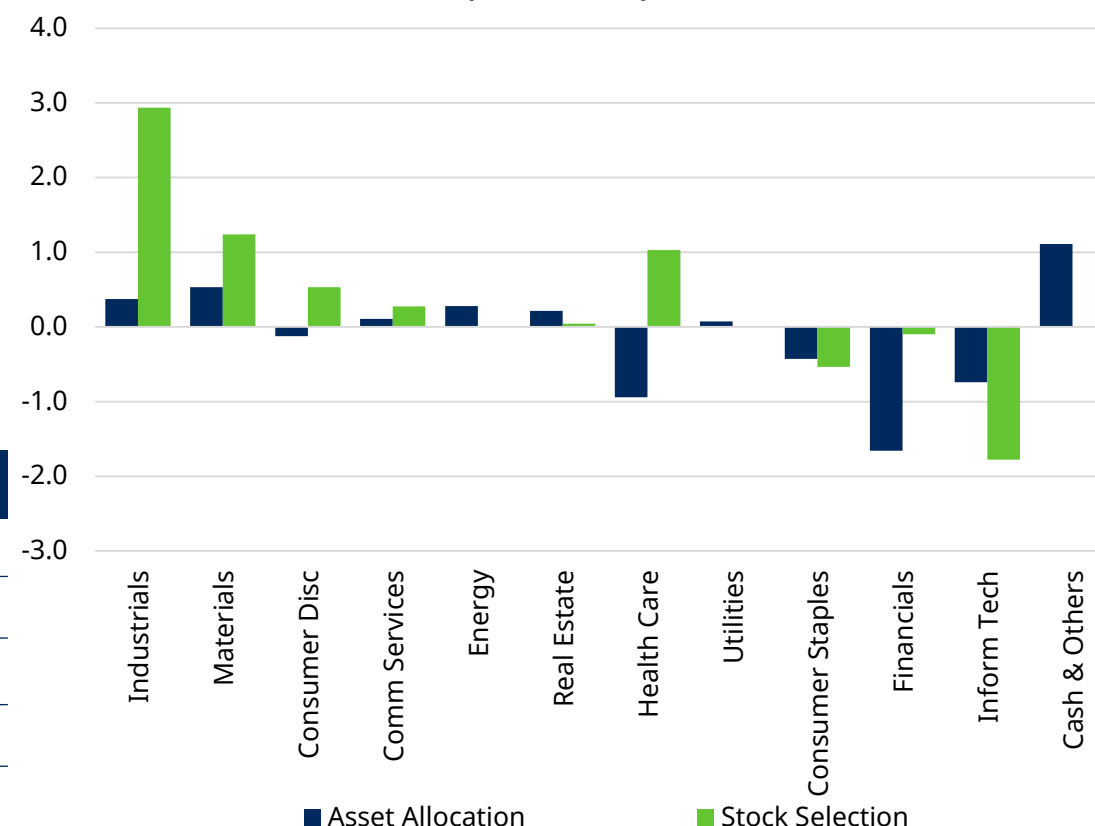
Performance attribution

1 year to April 30, 2019

Top 5 contributors	OW / UW	Sector	%
China International Travel Service	O/W	Consumer Disc	0.9
Hefei Meiya Optoelectronic Technology	O/W	Industrials	0.9
Anhui Kouzi Distillery	O/W	Consumer Staples	0.8
Zhejiang Dingli Machinery	O/W	Industrials	0.7
Shanghai International Airport	O/W	Industrials	0.5

Top 5 detractors	OW / UW	Sector	%
Huadong Medicine	O/W	Health Care	-1.4
Kweichow Moutai	NIL	Consumer Staples	-1.1
Focus Media Information Technology	O/W	Inform Tech	-1.0
Leyard Optoelectronic	O/W	Inform Tech	-1.0
Chaozhou Three-Circle	O/W	Inform Tech	-0.6

Performance attribution (% in USD)



Past performance is not a guide to future performance. The value of investment can go down as well as up and is not guaranteed.
The sectors, securities, regions and countries shown are for illustrative purposes only and are not to be considered a recommendation to buy or sell.
Source: Schroders. For illustrative purposes only based on a representative account. Composition is subject to change over time.

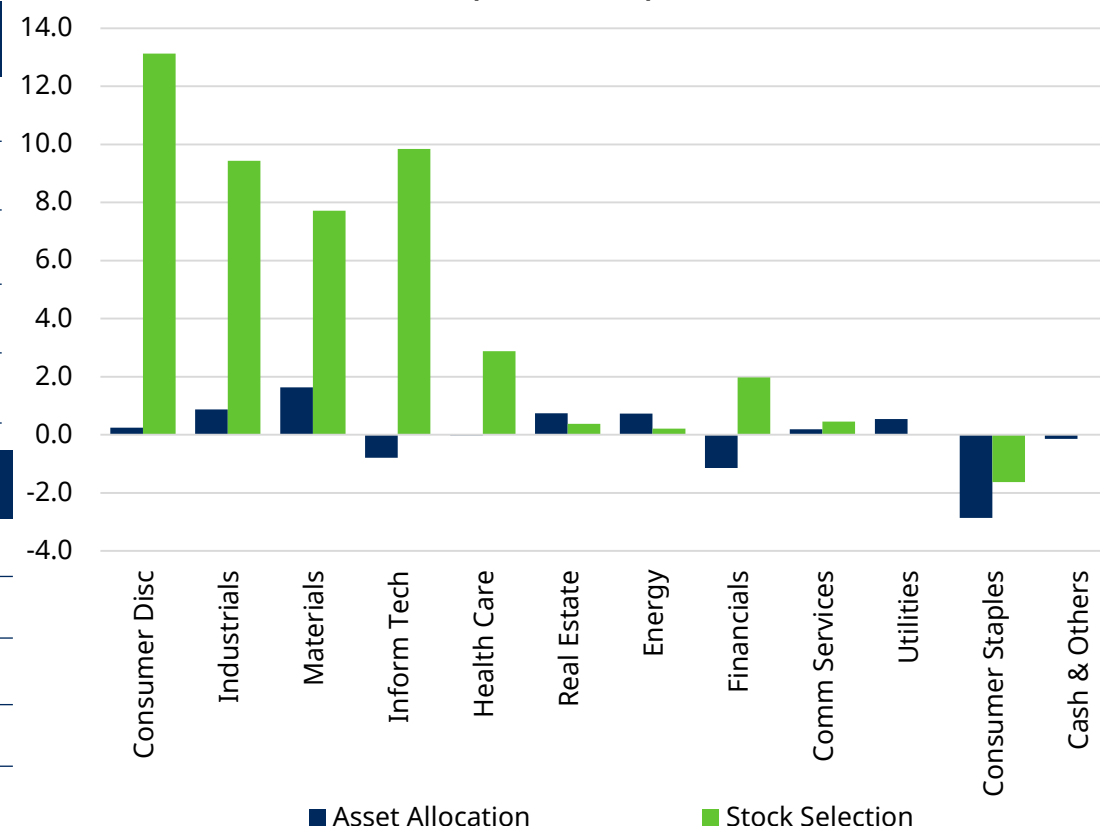
Performance attribution

3 years to 30 April 2019*

Top 5 contributors	OW / UW	Sector	%
Hangzhou Hikvision Digital Tech	O/W	Inform Tech	5.5
China International Travel Service	O/W	Consumer Disc	4.4
Midea	O/W	Consumer Disc	3.4
Jiangsu Hengrui Medicine	O/W	Health Care	1.9
Wanhua Chemical Group	O/W	Materials	1.9

Top 5 detractors	OW / UW	Sector	%
Kweichow Moutai	NIL	Consumer Staples	-3.4
Hithink Royalflush	O/W	Financials	-1.9
Gree Electric Appliances	U/W	Consumer Disc	-1.2
China Merchants Bank	U/W	Financials	-1.2
Aisino Corp	O/W	Inform Tech	-1.1

Performance attribution (% in USD)



Past performance is not a guide to future performance. The value of investment can go down as well as up and is not guaranteed.

The sectors, securities, regions and countries shown are for illustrative purposes only and are not to be considered a recommendation to buy or sell.

* Based on the performance of Schroder China Equity Alpha Fund, which is the same strategy as SISF China A but longer performance track record.

Source: Schroders

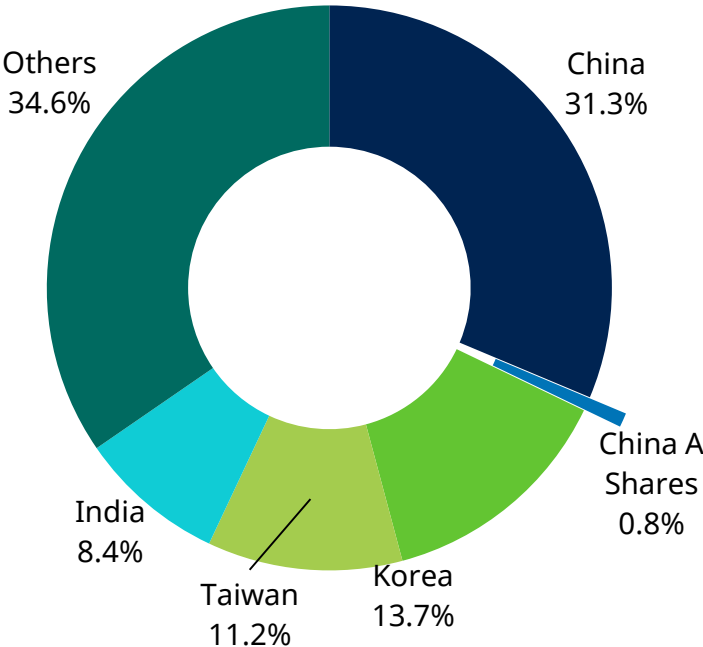


Appendix – Why China A

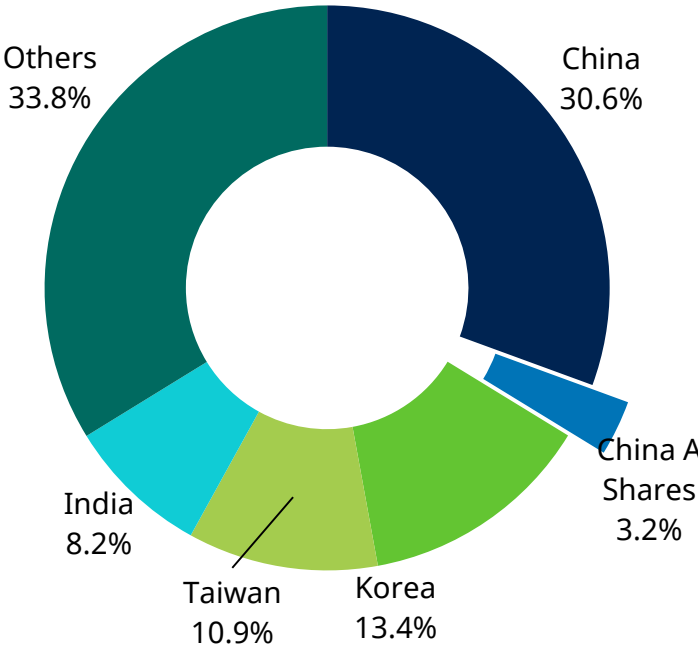
China A – Becoming larger part of global indices

Pro-forma - MSCI Global Emerging Markets Index

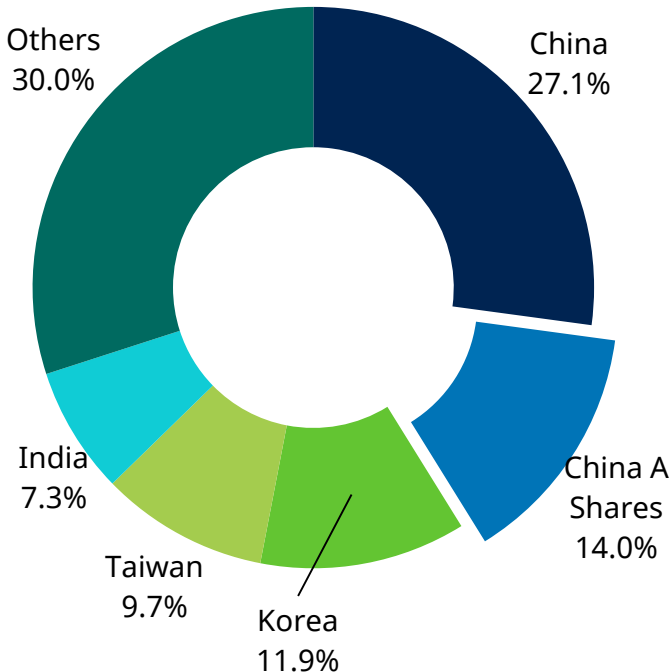
A-share weight in MSCI EM Index upon 5% inclusion factor (Current)



A-share weight in MSCI EM Index after 3-step to 20% inclusion factor¹ (Nov 2019)



A-share weight in MSCI EM Index upon full inclusion²



¹Increasing the inclusion factor of China A Large Cap shares from 5% to 20% and include China A Mid Cap shares, including eligible ChiNext shares, with a 20% inclusion factor.

²Securities eligible for trading through Stock Connect stocks only

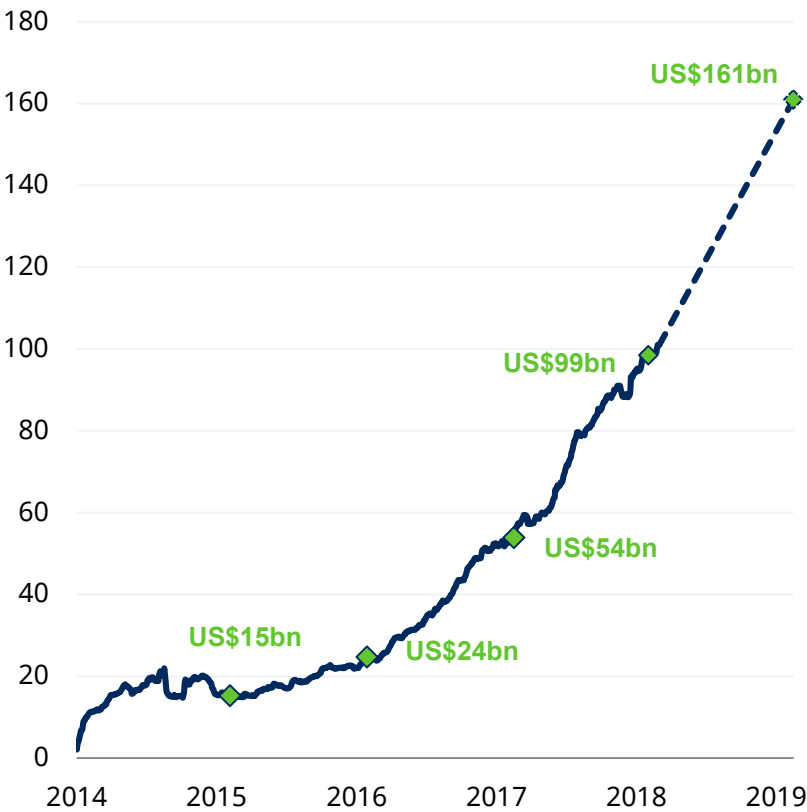
Source: Schroders and MSCI, data as of February 28, 2019.

MSCI inclusion supportive of long term re-rating

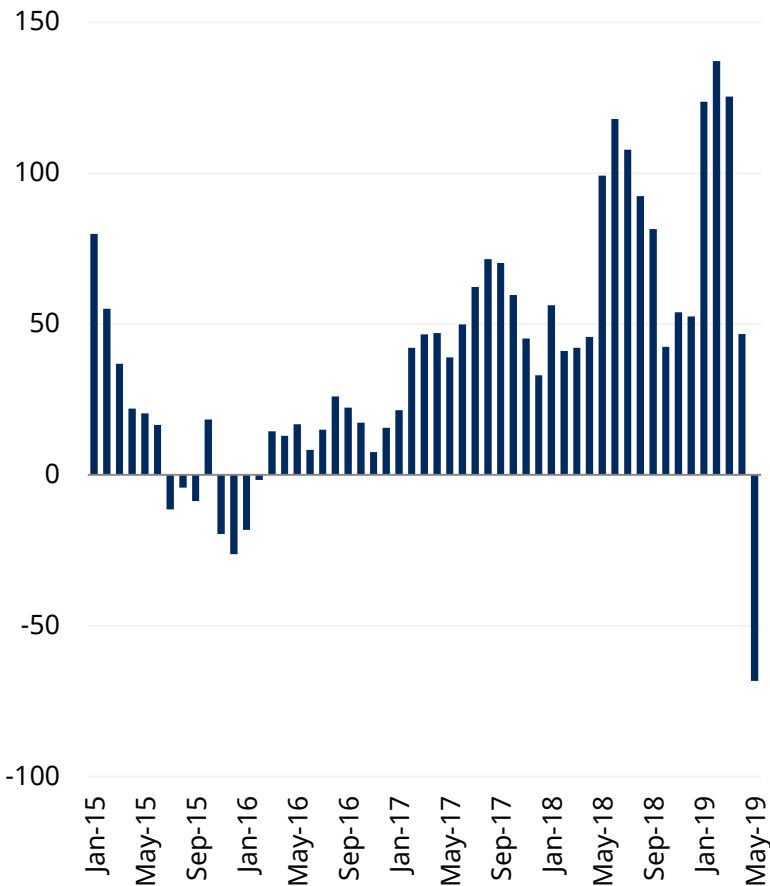
StockConnect flows accelerated ahead of MSCI decision

Northbound flow into China A shares¹

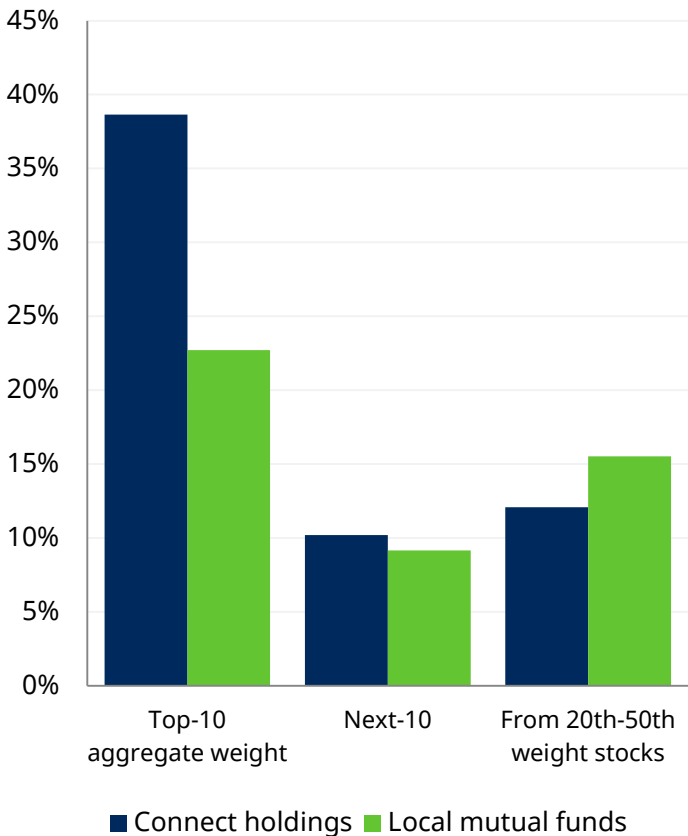
Cumulative Northbound buying (US\$bn)



A-share Connect, net inflows 3M cumulative²



StockConnect flows are concentrated in select stocks³



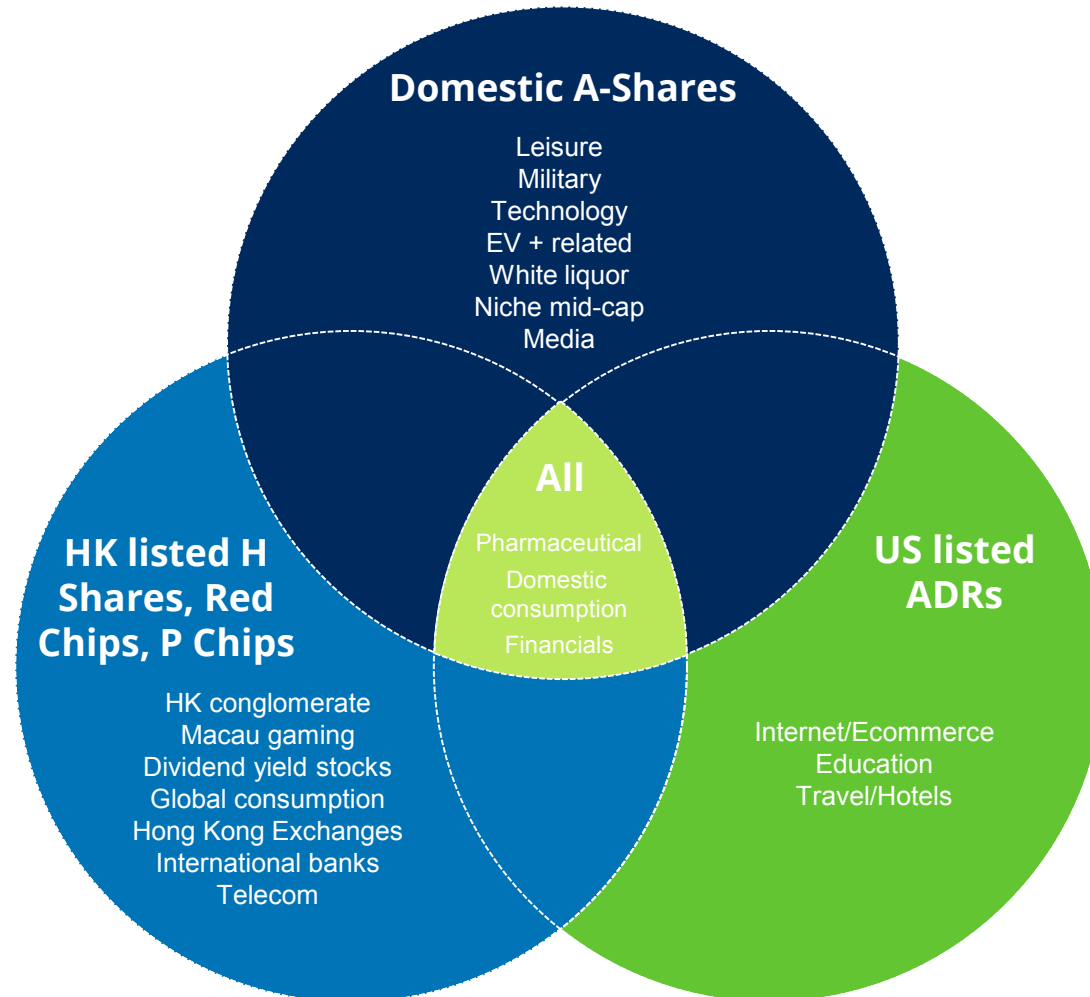
¹Source: Bloomberg, Goldman Sachs, January 2019.

²Source: Wind, May 2019.

³Source: Wind, March 2019.

Why China A?

Provides access to opportunities not available in offshore China equity markets

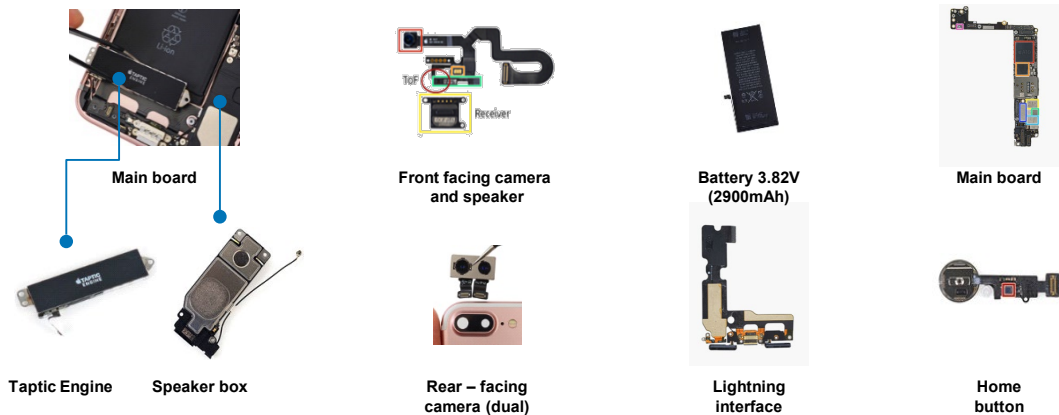


Source: MSCI, Schroders.

China A-Shares offer unique exposure

Chinese companies are moving up the value chain

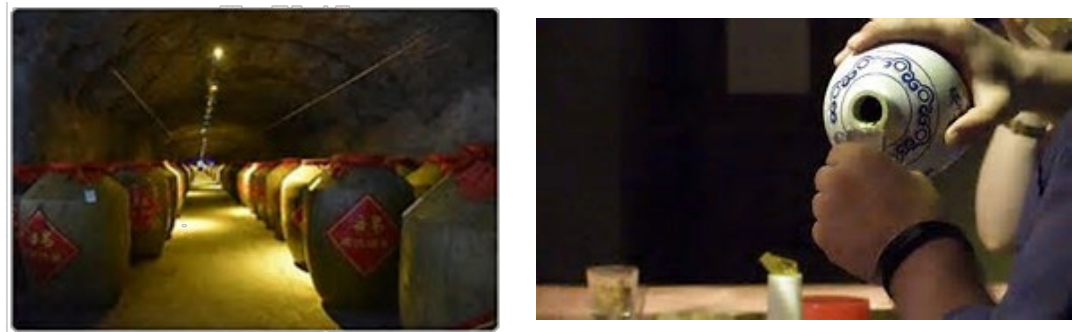
Apple supply chain-related companies



Mass-market consumption – home appliances



Mass-market consumption – Baijiu (white liquor)



Technology/high-end manufacturing



Source: Schroders. For illustrative purposes only.

Opportunities in the areas of domestic consumption

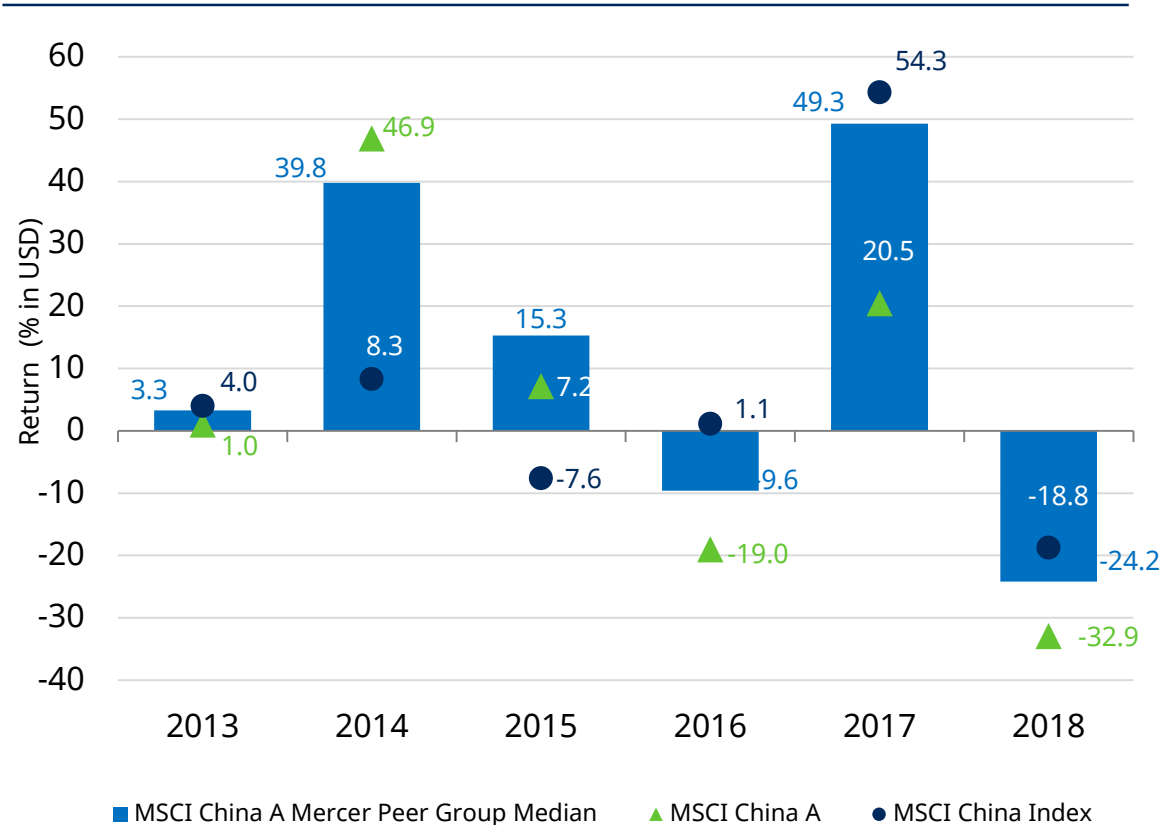
Particularly as China moves towards a consumption-led economy



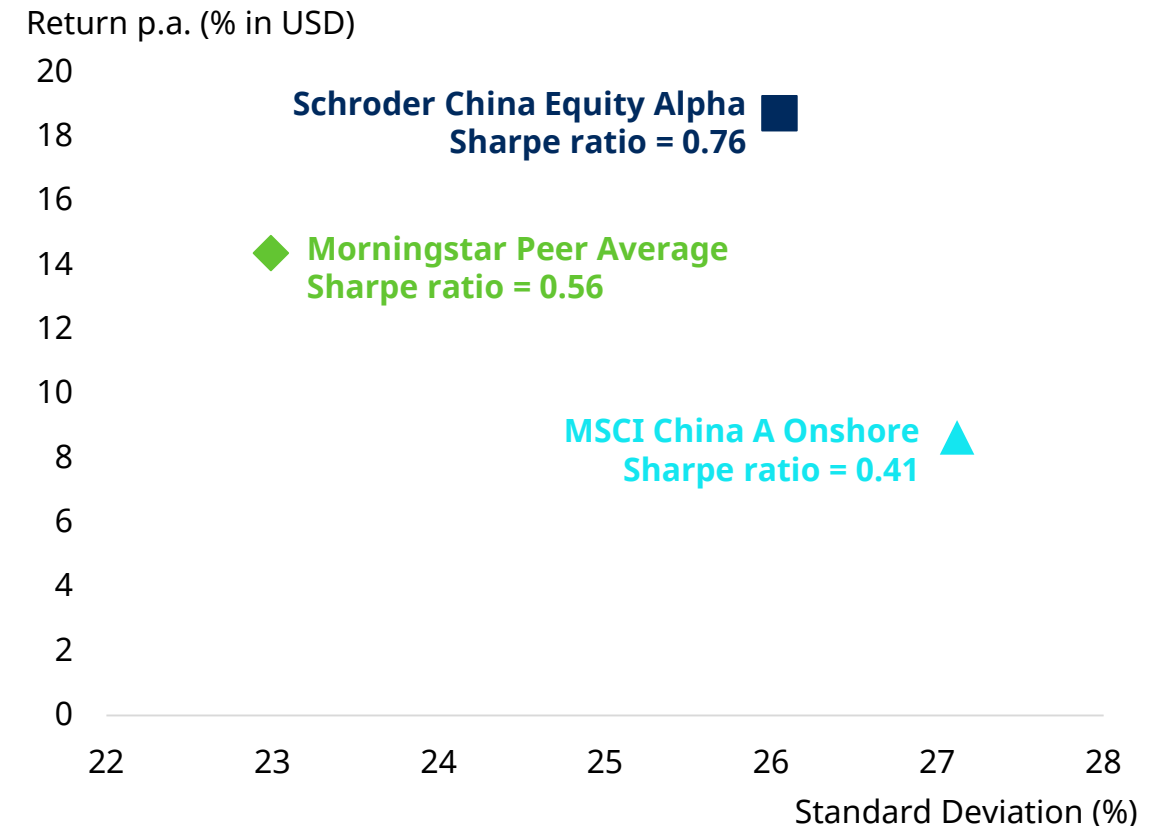
Why China A?

Ripe for active managers – even the median manager has been able to add alpha

Return by Calendar Year



5 year Risk Return Profile (March 2019)

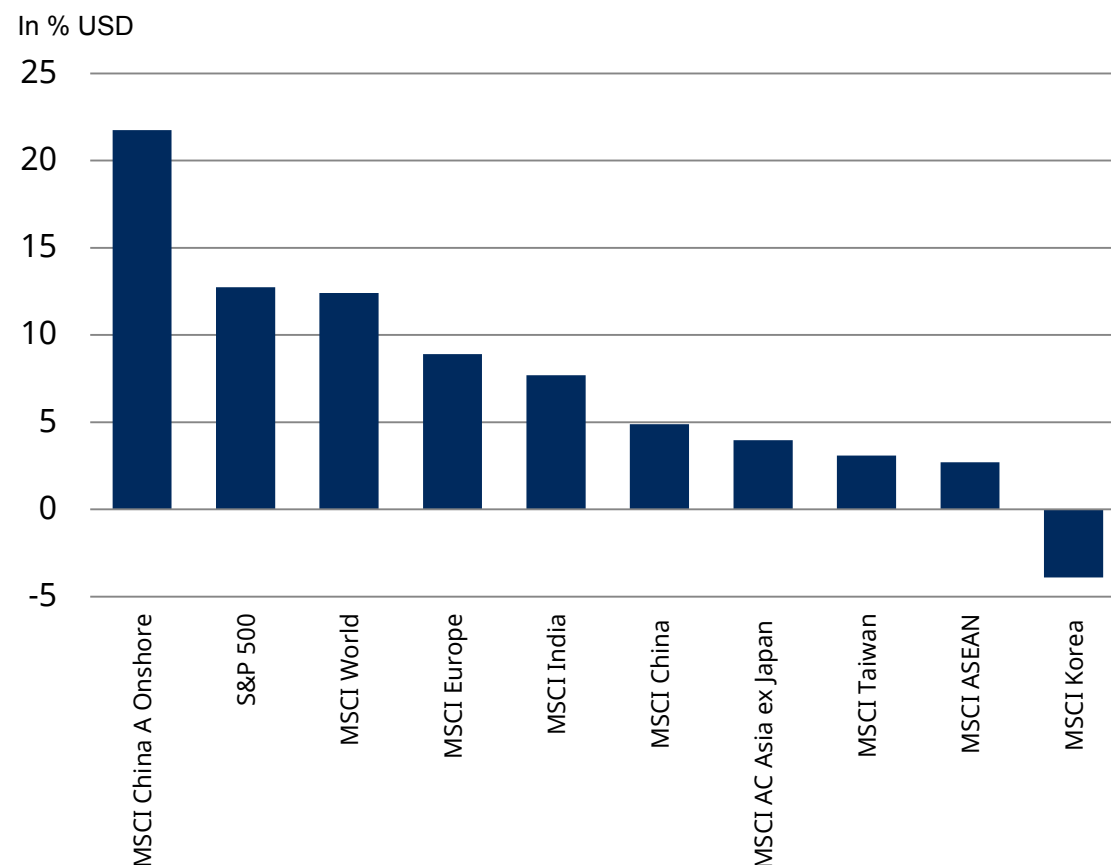


Source: Schroders, Mercer and Morningstar, as of March 2019. Past performance is no guarantee of future results.

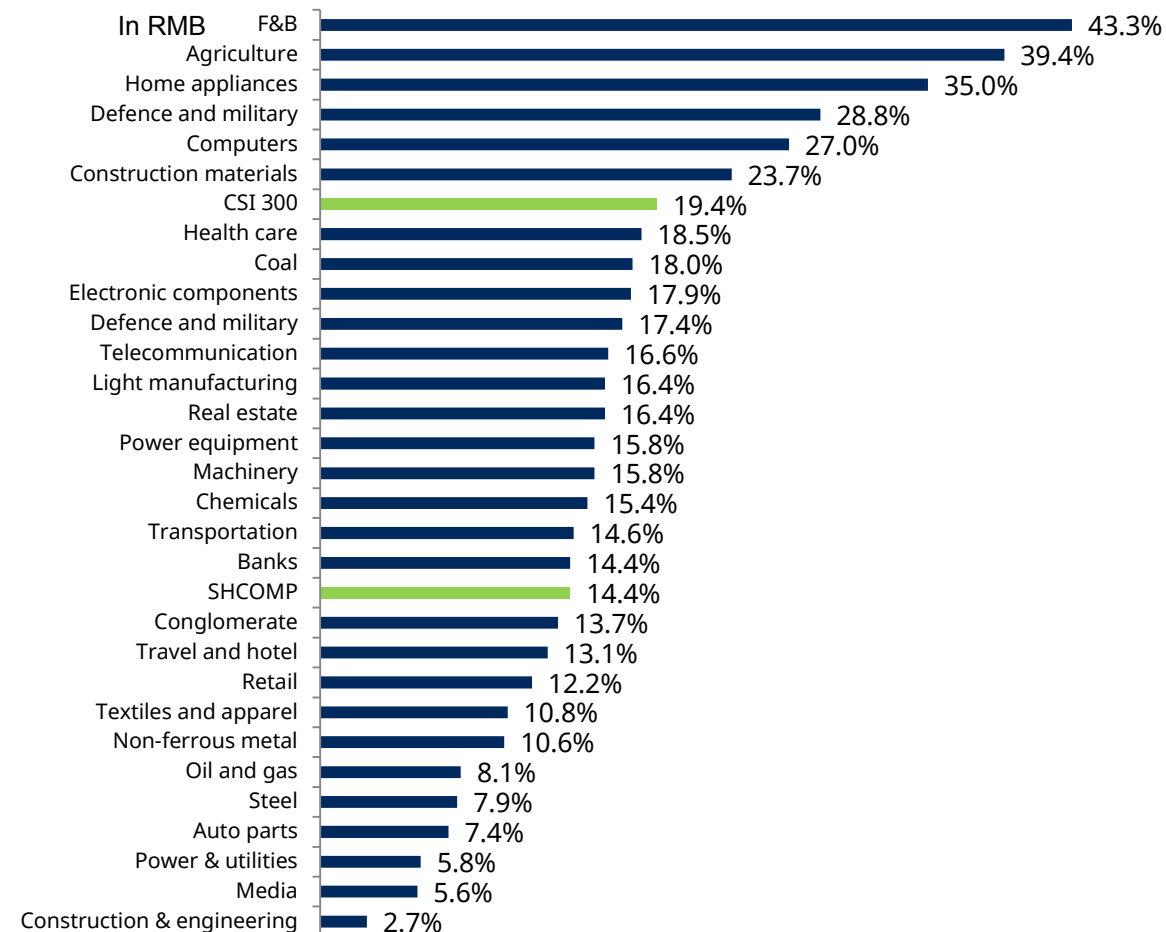


Strong YTD performance for China A-Shares

YTD market performance



YTD A-share performance by sector



Source: Bloomberg, CICC, data as of May 27, 2019. Past performance is no guarantee of future results.

What drove the rally in 1Q 2019?

1. Fed pivot
2. China stimulus
3. Optimism around trade discussions

China: key announcements to support growth

GDP growth target set at 6-6.5% for 2019

China's recent policy announcements (2019):

Sector	Policies
VAT Cut	Reduce 16%/10% VAT rate to 13%/9% from April 1. Total impact 1trn Rmb p.a. (~1% of GDP)
Social security payment	Lower pension payments from 20% to 16% from May 1
Local government bonds	General purpose bond quota at 930 bn (830 bn in 2018) Special purpose bond quota at 2.15 trln (1.35 trln in 2018)
Railway FAI	800 bn Rmb Vs actual spending of 735 bn in 2018
Hukou relaxation	Cities with < 3m population to scrap residency registration system Cities with 3-5m population to comprehensively relax permanent residency requirement
Credit growth	Guidance to increase lending to private sector
Science & technology Board	New registration based system to be launched on Shanghai Stock exchange. Stock exchanges to decide on candidates to be listed
Tax cuts	Subsidies for home appliances in rural areas Auto purchase tax cut on small/energy saving cars Personal income tax cut – c. Rmb600bn p.a.; Reduced corp payroll tax rate 19% to 16% - c. Rmb400bn p.a.

Source: Schroders, April 2019. The views and forecasts contained herein are those of the Schroders Greater China Team and are subject to change.

2019 stimulus in context

Smaller credit impulse, more emphasis on tax cuts, less property and commodity intensive?

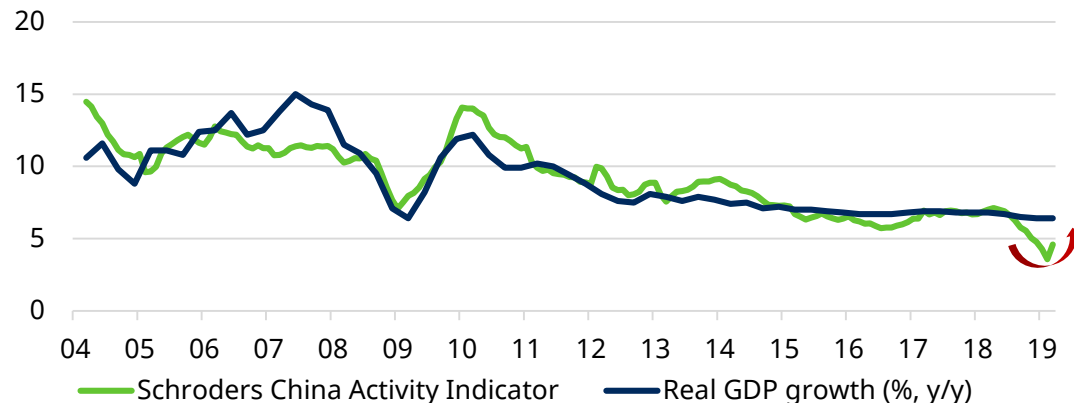
	2008-2009	2012-2013	2015-2016	2018-2019E
Augmented Fiscal Deficit (increase)	9.6% of GDP (2009)	4% of GDP (2012-13)	1.9% of GDP (2016)	1.5-1.8% of GDP (2019E)
Credit impulse (increase)*	25% of GDP (Oct 08 – Nov 09)	19% of GDP (early 12 – early 13)	15% GDP (Jun 15 – May 16)	11-12% of GDP (Dec 18 – Dec 19)
Credit growth (increase)*	18ppts (2008-09)	6ppts (early 12 – early 13)	4.7ppts (May 15 – Apr 16)	2ppt (Dec 18 – Dec 19)
Size of tax & fee cuts	0.9% of GDP in 2008 & 1.4% of GDP in 2009	No official estimate. Small cuts from business-for-VAT reform pilot	0.9% of GDP each year in 2015-16	1.4% of GDP in 2018 & 2.1% in 2019
Supply and capacity cuts	No meaningful reduction	No meaningful reduction	Steel: 65mn and 50mn ton cut in 2016-17 (~10% of total capacity), plus 140mn ton cut of illegal capacity. Coal: ~ 8% of total capacity.	Smaller cuts in steel and coal capacities in 2018. No specific targets in 2019.
Property policies	Major property policy easing, lowered down payment ratio, mortgage rates and eased developer access to credit	Marginal and differentiated property easing, increase of land supply	Major property policy easing: lowered down payment ratio, relaxed mortgage policies, provided shanty town cash subsidies, eased developer credit access, and some Hukou relaxation	Marginal and differentiated property easing, relaxation of Hukou policies

Source: CEIC, UBS estimates; Note: credit impulse: y/y change of new credit as a percent of GDP; credit growth: TSF excl equity/ABS/write-offs/special local government bond + total local government bond.

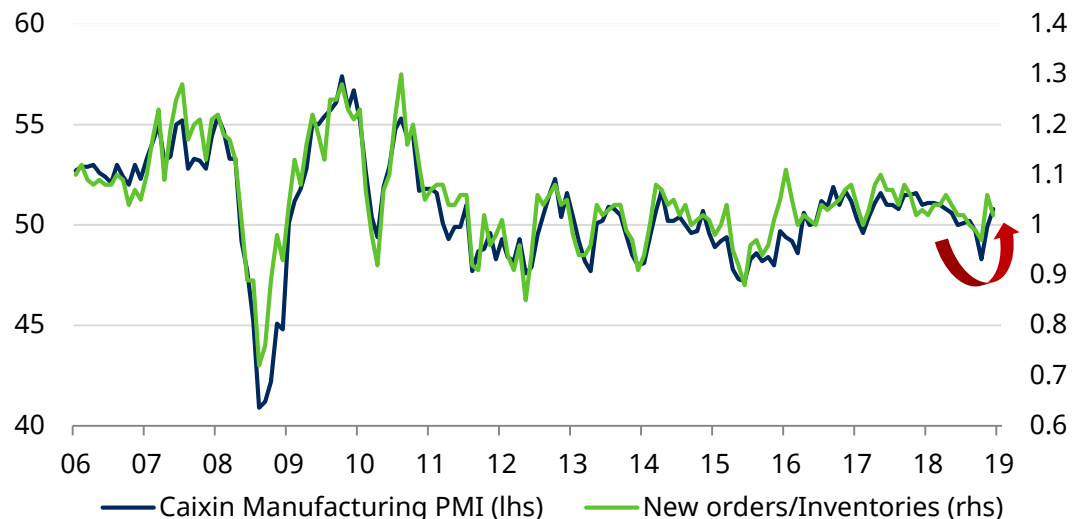
China - growth momentum slowed, seeing first green shoots?

Stimulus measures starting to take effect, but trade conflict could stall recovery

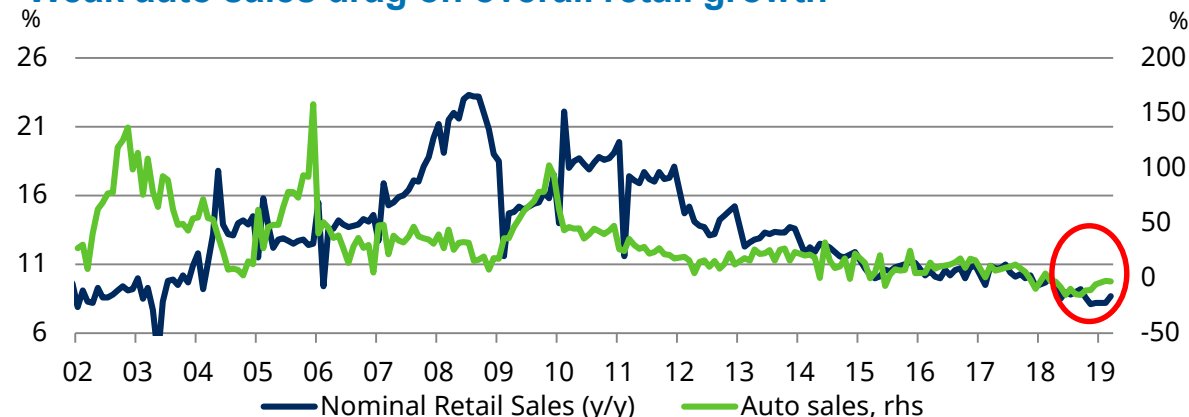
Schroders Composite activity index v. GDP growth



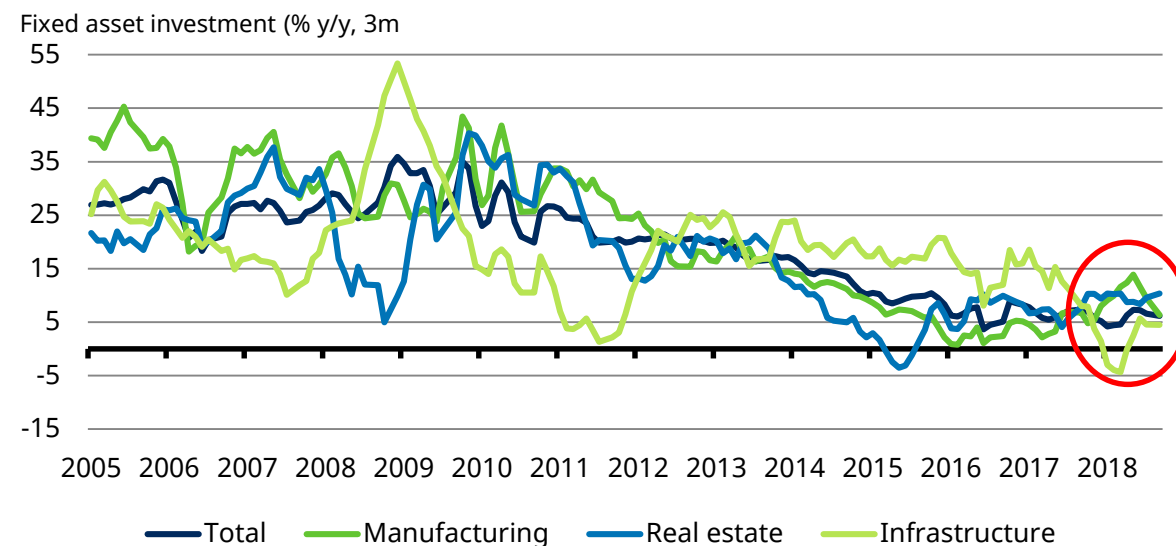
PMI Indices



Weak auto sales drag on overall retail growth

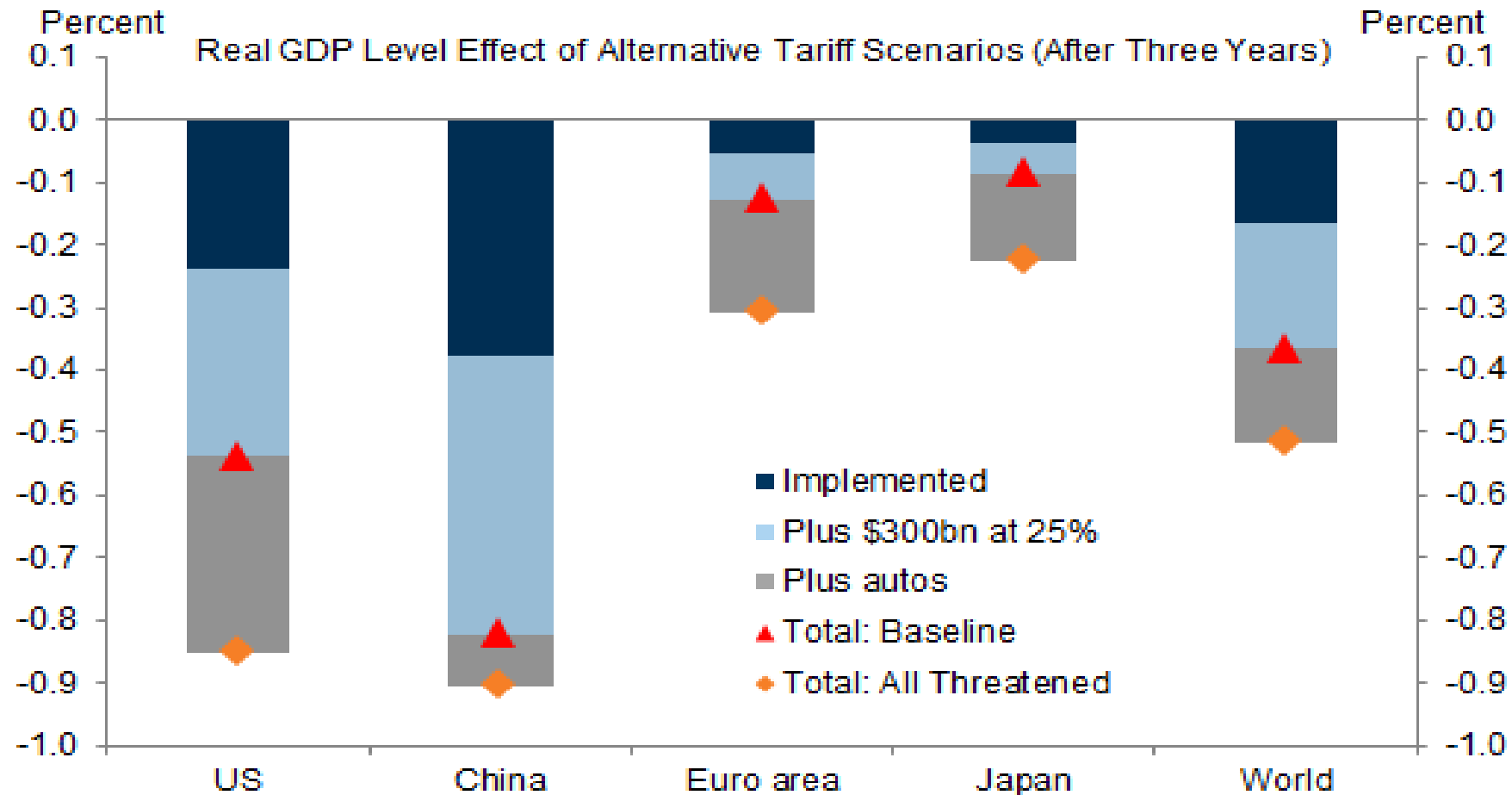


Infrastructure spend a drag on fixed asset investment



Trade conflict

Potential impact on global economies



Source: Goldman Sachs, May 2019.

Trade conflict

Not all doom and gloom, China continues to open up

China's recent policy announcements:

Sector	Policies
Automobiles	Cut import duty by half from current 25% Allow foreign participation in domestic auto market: NEV – from 2018 CV – 2020 PV – 2022
Insurance, AMC, Securities	51% cap on foreign ownership for first 3 years and complete removal thereafter
Banking	Eliminate foreign shareholding cap in banks, allow them to simultaneously open branch and banking subsidiaries. By Dec'18 allow wider business scope for foreign banks
Regulatory	Merger of banking and insurance regulator – move towards unified, comprehensive supervision of financial sector
Capital flows	Stock connect daily quota expanded by 4X Northbound to 52 bn RMB Southbound to 41 bn RMB Pilot CDR scheme for innovative companies
WMP products	Bring off B/S exposure to Banks' balance sheet and become NAV based by end 2020. More flexibility given in July to manage the transition while keeping the end 2020 deadline

China Valuations

China A-Shares still trading close to trough levels

MSCI China Forward PE (x)







MSCI China A Onshore Forward PE (x)



Source: Factset, April 2019.

Investment strategy

How are we positioned?

Portfolio themes		Rationale
	Consumption upgrade	Prefer travel-related, consumer goods and services companies in light of further earnings growth
	Technology	Position more tech weightings on the back of new technology cycle
	Automation	Industrial 4.0 pointing to high automation demand amid rising labour costs.
	Healthcare	Prefer contract manufacturers and companies with strong product and R&D pipeline
	Financials	Prefer insurers over the banks, brokers may do better in 2019 vs backdrop of 'Financial supply side reform'
	Properties	Govt policies continue to control property market, demographics weigh on property purchase

Source: Schroders, as of April 30, 2019.

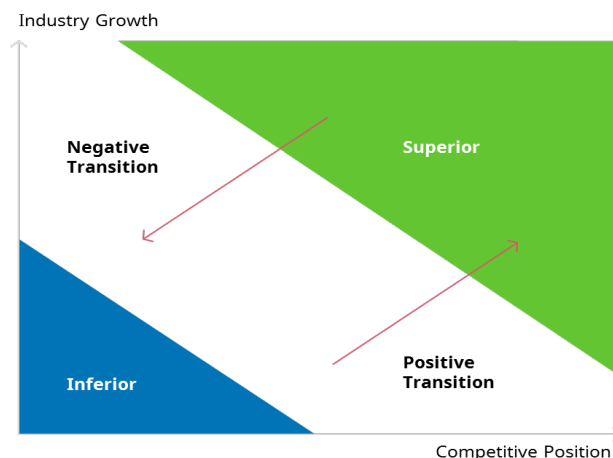
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Appendix – Investment process

Shareholder return classifications bring discipline

Analysts classify stocks based on projections for Return on Capital



Classification	Company Characteristics and Sample Companies
Superior	ROIC > WACC and stable/rising e.g. TSMC, AIA, Tencent, New Oriental Education, ZhuZhou CRRC Times, Hangzhou Hikvision
Positive Transition	ROIC < WACC but improving to a positive spread e.g. Weibo, Galaxy Entertainment, HSBC, Standard Chartered Bank and Wuxi Biologics
Negative Transition	ROIC > WACC but deteriorating e.g. Hong Kong utilities, TVB
Inferior	ROIC < WACC and not improving e.g. Coal, steel, construction machineries, shipping cos, airlines

Pivotal Question

Sameer Kakakhel & Candice Chen April 2018

Pivotal Question: What is the growth outlook for the Electric vehicles (EV)? How will the component supply chain evolve and how to play it in AXJ equities?

Industry impacted: Lithium Battery Cell/Pack makers, Component Chain (Cathode, Anode, Separator, Electrolyte), Auto OEM's

Key conclusions: Stocks impacted/ Actionable ideas: Lithium Ion Battery (LIB) technology, for at least the next 5 years, is likely to be the preferred format for electrified propulsion. From just \$13bn in 2017 (already larger than consumer LIB), EV LIB is on track to be a \$50bn revenue market by 2025 and over \$100bn by 2030 (this is excluding the large battery storage opportunity not discussed here). Thanks to generous subsidies and Govt. strategic push, China now accounts for over half the global Plug-in Electric vehicle (1.2mn; ex non plug-in hybrids) and LIB (~60GWh) market. Yet recent protectionist policies also means outlook for China vs Non-China players are quite different over next 2-3 years; ex China players are recovering from steep losses while Chinese players see margin pressure from falling subsidies and rising competition. Better scalability now becomes a foe for components helping supply to catch up with demand. This oversupply will mean falling margins, especially for Tier 2 and 3 players. We disagree with the view that battery cells are becoming a commodity ('another solar story') and believe top tier battery makers offer the best return potential along with select equipment suppliers and niche component players. Planned unwind of China subsidies by 2020 is welcome news for rest of the world (mainly Korea/Japan) provided they keep their technology edge. We are going to take a closer look at the China supply chain but 4 players are discussed in the note; Niche film producer CATL (IPO Expected 2018), Guoxuan (002074 CH; NR), and China, key stocks are tier 1 battery makers LG Chem (051910 rated) is a new player with least exposure but a potential dark horse as LIB business).

Watch list: EV Penetration rates China/ROW, battery form evolving battery technology and OEM intentions

Key Risk to Thesis: 1) EV penetration rates close to our 'Slow' oversupply in the entire LIB chain depressing profits and sent Govt. withdrawing subsidy support too soon b) Unexpected materials e.g. cobalt or c) Lower than expected mass market breakthrough (in the next 2-3 years) in battery format/China industry especially the components 3) Breakthrough in other

We're dedicated to thoughtful, deep-dive analysis.

Schroders

Equity Research

5 July 2018

Maurien Yau / Sameer Kakakhel

Pivotal Question

Pivotal Question: Where is China in its 'War' on pollution and how to play it?

Industry/ Country impacted: Wide impact including Steel, Coal, Chemicals (Plastics, Caustic...), Paper and multifaceted impact of the shifting energy pie including rise of natural gas and renewable's (New Energy vehicles chain has been discussed in a separate note).

Key conclusions: Just 3 years ago, Chinese authorities flatly denied US embassy readings of dismal Beijing air quality and yet the same readings were prominently posted in the breakfast area of the hotel we stayed in. This simple anecdote shows how rapidly the mood in China has changed in facing the environmental challenge. The regulatory framework was in place from early 2017, but the strong language used by President Xi at the party congress led to the harsh winter production cuts in 26+2 cities (Beijing-Tianjin-Hebei triangle). Major takeaway from our visit is that these rules are being tightened further not eased e.g. 'steel capital of the world' Tangshan has given a deadline of Oct 18 for its steel players to switch ultra-low emissions which is much earlier than expected. A new rumour during our recent visit was that, following Tianjin in September 2017, Bohai region may also ban coal trucking in September 2018. Yet two key points to bear in mind a) China clean-up is not a new story so far upside to equity prices the impact has to be larger than expected and/or structural in nature b) The upturn in demand has likely exaggerated the impact which could mean near term risks e.g. ban on waste plastic and paper imports helping apparent domestic demand. To frame the discussion, let's divide the sectors into those with a supply glut and where China is still short.

China surplus industries - steel, cement, paper, PVC/Caustic soda, Aluminium/Bauxite Mining, Coal, Urea, Glass

Inefficient/illegal capacity shutdown along with curbs on production is helping reduce total supply and restoring some degree of pricing power. Larger local and global producers gain vs as advantage to scale and technology rises. Most of these players were focusing on top line growth and regularly destroyed value. Steel, glass and paper industries were in persistent surplus but balances and returns have seen a sizable positive shift which is likely to continue at least near term.

China shortage industries - Natural gas (E&P), LNG, Plastic (PE), copper, EV supply chain, railway freight transport & gas equipment

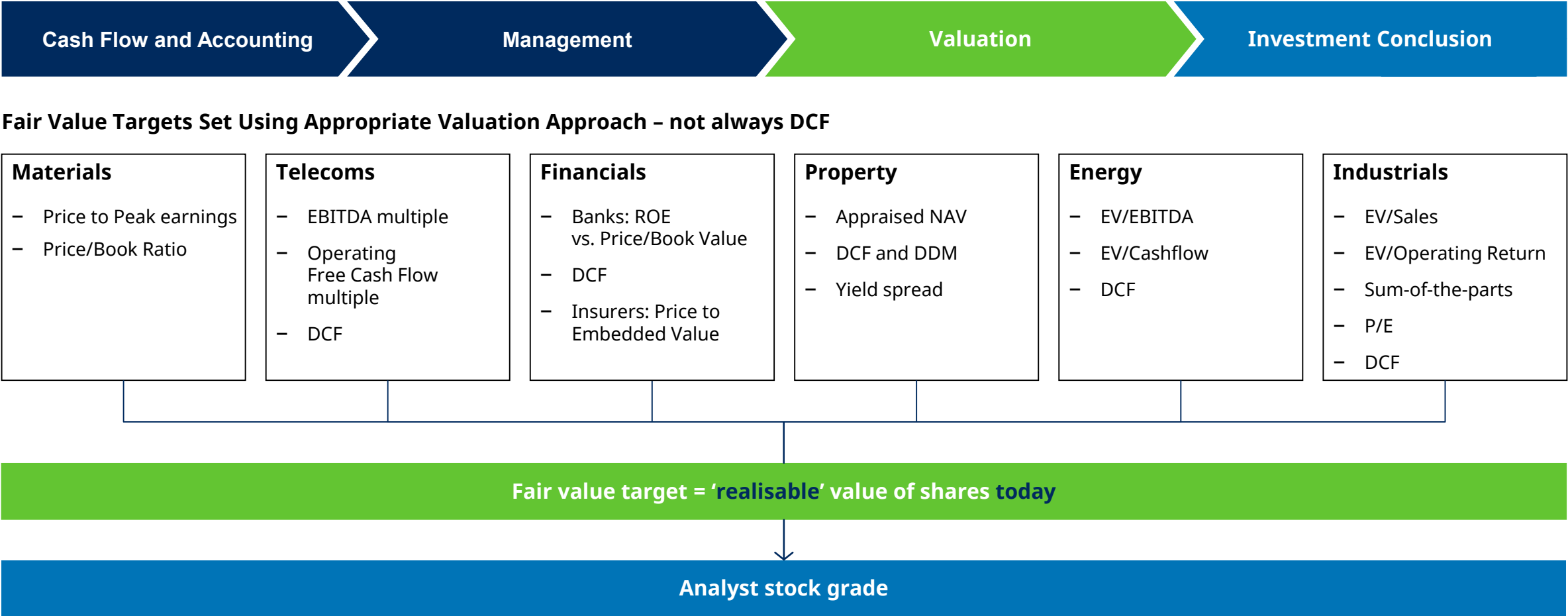
Source: Schroders.

For illustrative purpose only, it does not represent any recommendation to invest or disinvest in the above-mentioned sectors.

Schroders

Company analysis

Proprietary fundamental research



Source: Schroders.
For illustrative purpose only, it does not represent any recommendation to invest or disinvest in the above-mentioned sectors.

ESG

Integrated into day to day research – stand alone box ticking is not good enough

Environmental

- Climate change mitigation and adaptation
- Environmental risks and pollution
- Risks and opportunities from renewable energy
- Risk of stranded assets

Social

- Labour practices and relations
- Community relations
- Predatory lending

Governance

- **Track record with minorities**
- Professionalism and qualifications of management
- Voting structure and domicile
- Board composition
- Executive compensation
- Disclosure and transparency

- Commercial approach – focus on identifying longer term risks to the business and the investment case
- Linked to Grades and Fair Values
- **Governance is key – well managed companies tend to have less issues with “E” and “S”**
- Detailed bottom-up understanding of business model and management track record key to identifying potential vulnerabilities
- Engagement with company management on ESG issues in regular visits
- Support for Asian analysts from London based ESG specialists – analyst training, global research reports

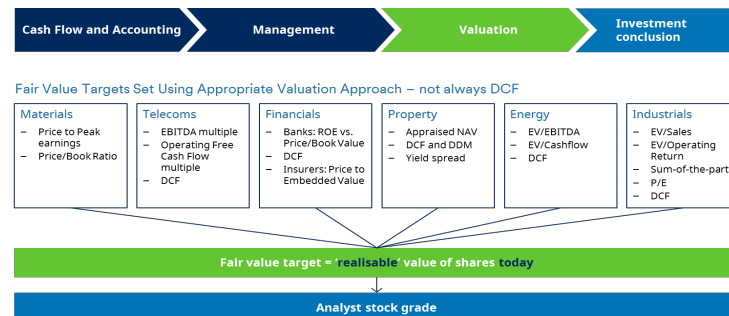
Portfolio construction

Determining stock position sizes

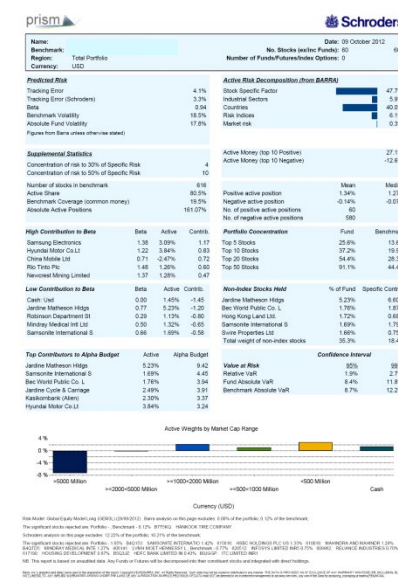
Shareholder return

Classification	L-T Portfolio Position ¹
Superior	Overweight
Positive transition	Overweight
Negative transition	Zero Weight
Inferior	Zero Weight

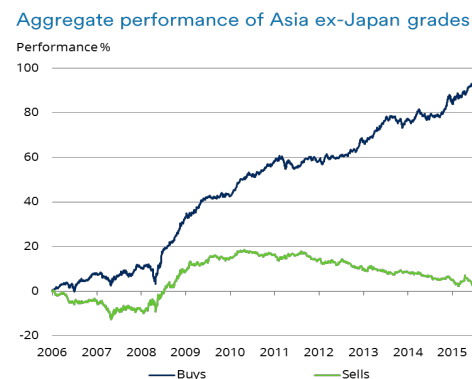
+ Valuation and conviction



+ Risk Management



= Portfolio weight



Shareholder return sets the long term framework for portfolio construction focusing analysts' research to identify companies that are generating superior shareholder return, or are in a turnaround or transition position (negative or positive). The conviction level is driven by Stock Grades and Valuation while the Risk and Country overlay provide a further check on portfolio weights.

For illustrative purpose only.
¹Subject to Valuation and Risk.

Portfolio construction

Sell discipline

Stock positions will be reviewed with a view to sale when:

- A company is trading at or above the top of our analyst's assessment of its fair value target
- A more attractive investment opportunity is identified
- There is a change to management strategy
- A major sale of assets or divisions has occurred
- There is an unexpected structural change to an industry in which the company is involved



Appendix – Schroders China Capabilities

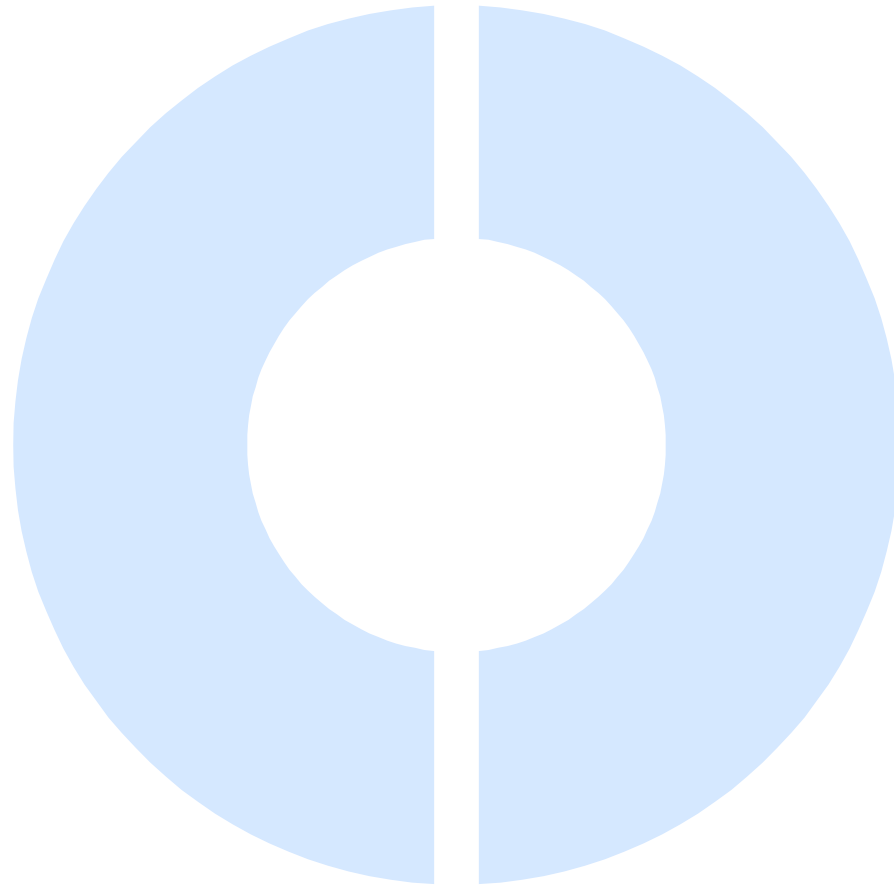
Schroders China Equity Capabilities

Key characteristics - strategies across the range

Strategy	SISF Greater China	SISF Hong Kong	SISF China Opps	SISF China A	SISF All China
Universe	Hong Kong, China, China A, Taiwan	Hong Kong, China, China A	China, China A, Hong Kong	China A	Hong Kong, China, China A
Fund AUM (US\$m)	1,382	2,406	1,209	557	57
Capability Assets (US\$m)	2,578	6,188	2,522	1,848	57
Benchmark	MSCI Golden Dragon	FTSE Hong Kong Hang Seng Index FTSE MPF Hong Kong	MSCI China	MSCI China A Onshore	Bespoke, 70% MSCI China +30% MSCI China A Onshore
Exposure to A Shares	11%	6%	9%	100%	33%
Relative return objective¹	+ 3% to 4% p.a.	+ 2% to 4% p.a.	+ 3% to 4% p.a.	+ 3% to 4% p.a.	+ 3% to 4% p.a.
Inception date⁴	March 2002	January 1988	February 2006	March 2013	June 2018
Tracking error²	3% to 7%	2% to 8%	3% to 7%	Up to 12%	3% to 8%
# Holdings	40-60	30-80	40-60	30-60	30-60
Turnover³	50% to 100%	30%-80%	50% to 100%	100% to 150%	50% to 120%
Fund Manager	Louisa Lo Maggie Zheng	Amelia Wong Maggie Zheng Toby Hudson	Louisa Lo Maggie Zheng	Jack Lee Louisa Lo Maggie Zheng	Louisa Lo Jack Lee

Source: Schroders, as of March 31, 2019. Schroder ISF are not available to US investors. No investment strategy can offer guarantees on future returns or target objectives.

¹Over rolling 3 and 5 year periods, gross of fees in USD terms. ²Ex-ante over rolling 3 year period. ³Annualised. ⁴Of the pooled vehicle.



Team

Biographies



Jack Lee, CFA

Lead Portfolio Manager, Head of China A-Share Research

- Based in Shanghai, China
- Over 20 years of investment experience.
- Over 7 years with Schroders.
- Jack joined Schroders from Huatai-Pinebridge Fund Management where he was the Head of Global Investment responsible for QFII & QDII investments. Prior to this, from 2007 to 2009, Jack was a Portfolio Manager at Abu Dhabi Investment Authority managing Hong Kong, China and QFII portfolios. Earlier, Jack was a Central Dealer and Senior Investment Analyst at AIG Global Investment Corp (Asia) (from 1999 to 2004), before transferring over to AIG-Huatai Fund Management as an Investment Manager (from 2004 to 2007). Jack's investment career began in 1998 at Tai Fook Securities. Jack is a CFA charterholder, ACCA (final stage) and holds Bachelor of Business Administration (Accounting), Chinese University of Hong Kong.



Louisa Lo, CFA

Co-Portfolio Manager; Head of Greater China Equities

- Based in Hong Kong
- Over 26 years of investment experience.
- Over 22 years with Schroders.
- Louisa joined Schroders in 1996 in our Hong Kong office. Prior to joining Schroders, Louisa spent three years working as a research analyst with securities firms, focusing on regional electronics stocks. Louisa is responsible for all aspects of the investment process and ultimately responsible for products managed by the Greater China investment desk. She is the specialist fund manager for Greater China mandates and lead manager of the Schroder ISF Emerging Asia, Schroder ISF Taiwanese Equity, Schroder ISF China Opportunities and Schroder ISF Greater China. Louisa holds a Master's degree in Applied Finance from Macquarie University in Sydney and a Bachelor's degree in Commerce from the University of Melbourne. She also holds the Chartered Financial Analyst designation.

Team

Biographies



Raymond Maguire, Ph.D

Head of Research, Asia ex Japan

- Raymond joined Schroders in March 2015 and is based in Hong Kong.
- Raymond's investment career commenced in 1997 as a sell-side equity analyst at UBS (London) and subsequently assumed the role of Managing Director over a ten year period.
- In 2006, Raymond moved to UBS' Fundamental Investment Group (Hong Kong), the Bank's internal hedge fund, where he was a senior portfolio manager running an Asia Pacific long-short equity strategy.
- Raymond then founded his own hedge fund in 2009, running a global equity long-short strategy.
- Raymond returned to UBS in September 2012 as Head of Equity Research & Strategy, before joining Schroders in 2015.
- Raymond holds a Ph.D. in Chemistry from the University of Edinburgh.



Allan Duckett

Institutional Director

- Allan Duckett is the Institutional Business Development Director covering the Western US. He is responsible for client service and marketing of Schroders' Institutional capabilities to public fund, corporate, foundation and endowments. He joined Schroders in 2015.
- Allan was Director Institutional Sales at MFS Investment Management from 2008 to 2015. Allan was the Director of Institutional Sales at MFS Investment management responsible for the Western U.S.
- He was a Senior Relationship Manager at AllianceBernstein (AB) from 2002 to 2008 where he progressed from a sales/client service associate to a Senior Relationship Manager. At AB, Allan helped open their West Coast Institutional offices.
- Qualifications: MBA from the University of California - Berkeley; BA in Finance, Investment and Banking from University of Wisconsin - Madison. FINRA Series 7, 31 and 63.

Important information – North America

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- fund holdings data; and
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Important information

The returns are presented as gross returns, including cash, reinvestment of dividends, interest and other income earned in the period and are calculated on a trade date basis after transaction charges (brokerage commissions), but before taxes and management and custody fees. Performance would have been reduced by such fees and the effect of these fees on performance compounds over time.

As an illustration see the chart below. The value of a \$5,000,000 account would be reduced by the following amounts due to the compound effect of the management fees. (This has been calculated assuming an assumed constant return of 10% per annum¹ and a hypothetical management fee of 0.75% per annum, which has been applied on a simple average of opening and closing annual fund values).

	Gross Value	Net Value	Compound Effect
1 Year	\$5,500,000	\$5,460,625	\$39,375
3 Years	6,655,000	6,513,090	141,910
5 Years	8,052,550	7,768,403	284,147
10 Years	12,968,712	12,069,617	899,095

¹The assumed 10% return is hypothetical and should not be considered a representation of past or future returns. The actual effect of fees on the value of an account over time will vary with future returns, which cannot be predicted and may be more or less than the amount assumed in this illustration. Actual fees may differ from the assumed rate presented above. Please consult the Firm's Advisory Brochure (ADV Part 2) for a description of the fees.



EST. 1804



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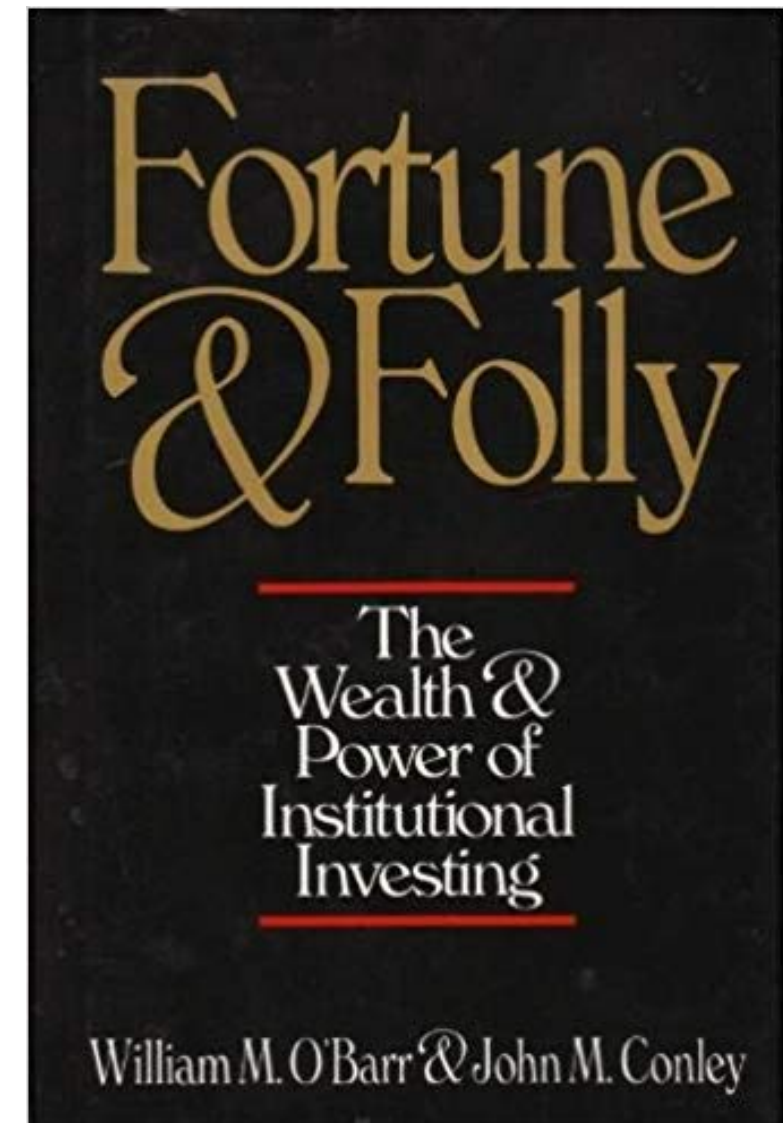
Schroders

INVESTMENT GOVERNANCE

**DECIDE WHO
GETS TO DECIDE**

FIRST CAUTION

- ▶ *Fortune and Folly* by O'Barr and Conley
 - ▶ Two cultural anthropologists spent time embedded in 9 pensions
 - ▶ Politics, displacing responsibility, & smoothing personal relationships is more important than economic and financial analysis



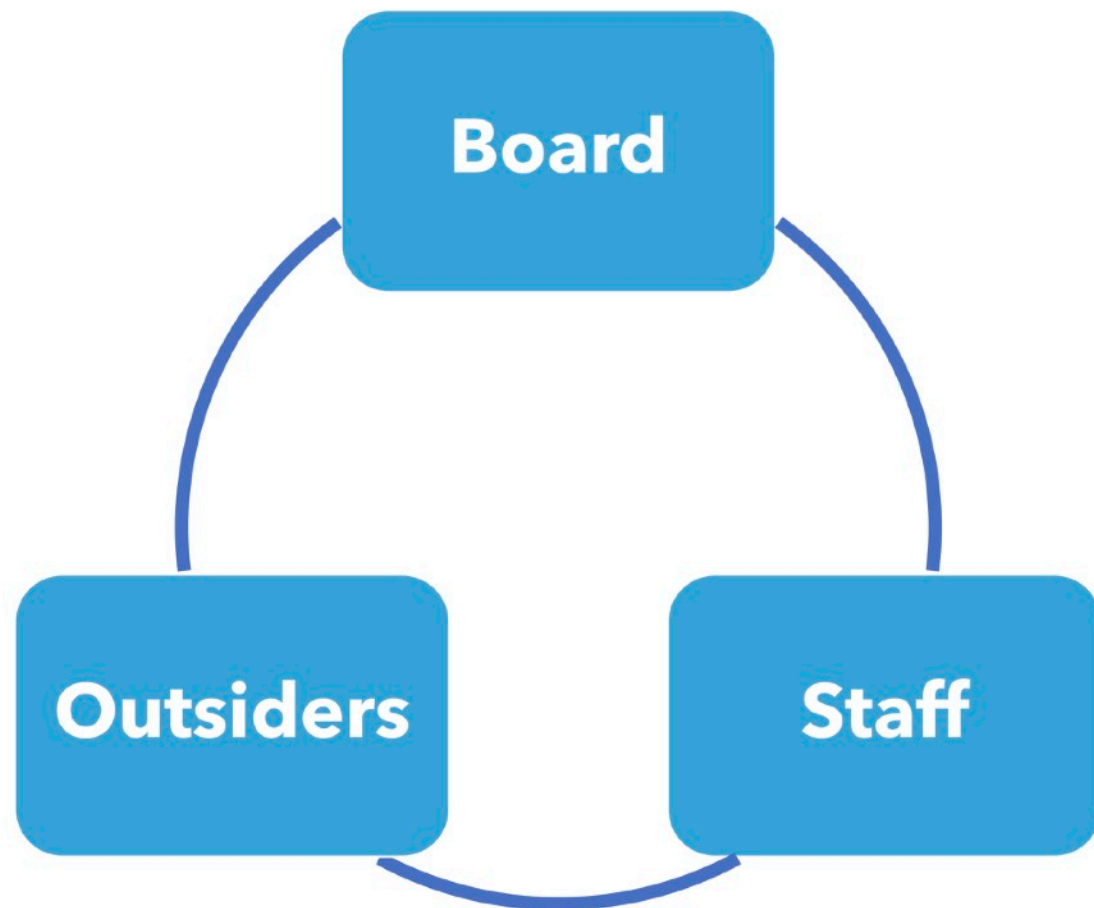
SECOND CAUTION

- ▶ Murder on the Orient Express by Charlie Ellis
 - ▶ All suspects are guilty
 - ▶ managers
 - ▶ consultants
 - ▶ staff
 - ▶ board



DECISIONS

DECIDERS AND DECISIONS



**GOVERNING OR
MANAGING?**

**POLICY ISSUES...ARE INESCAPABLY IN THE
COURT OF THE GOVERNING FIDUCIARIES.
EXECUTING DAY-TO-DAY
INVESTMENT DECISIONS AND HIRING THE
PEOPLE WHO MAKE THEM ARE NOT.**

—Pension Fund Excellence


DECISION HIERARCHY



PERSPECTIVE FROM 2005

- ▶ Guide and evaluate system performance
- ▶ Provide long-term strategic and financial planning
- ▶ Ensure the assets and liabilities of the system are balanced
- ▶ Implement formal system of checks and balances
- ▶ Work in the best interests of the state and its public employees

DECISION FACTORS

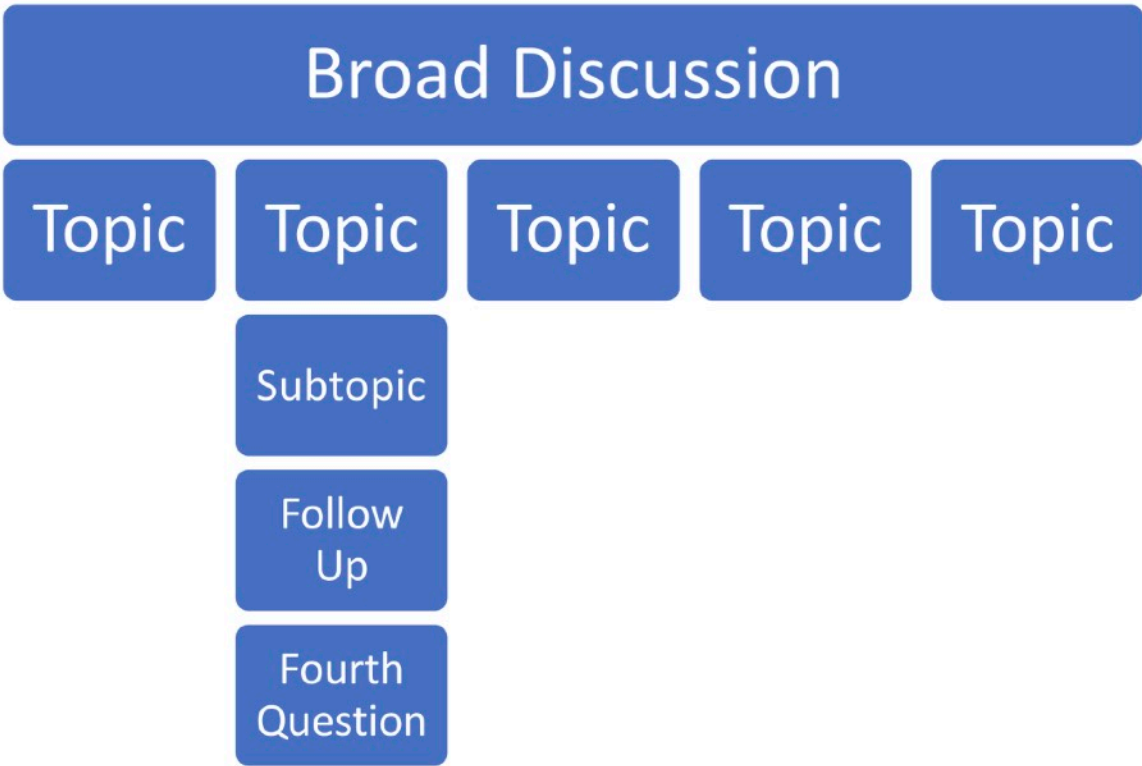
- ▶ Strategic time allocation of the board 
- ▶ What can and cannot be delegated
- ▶ Timeliness of decisions
- ▶ Competence
- ▶ Trust
- ▶ Verify

**EFFECTIVE INVESTMENT GOVERNANCE
ENSURES THAT DECISIONS ARE MADE
BY INDIVIDUALS OR GROUPS WITH THE
NECESSARY SKILLS AND CAPACITY.**

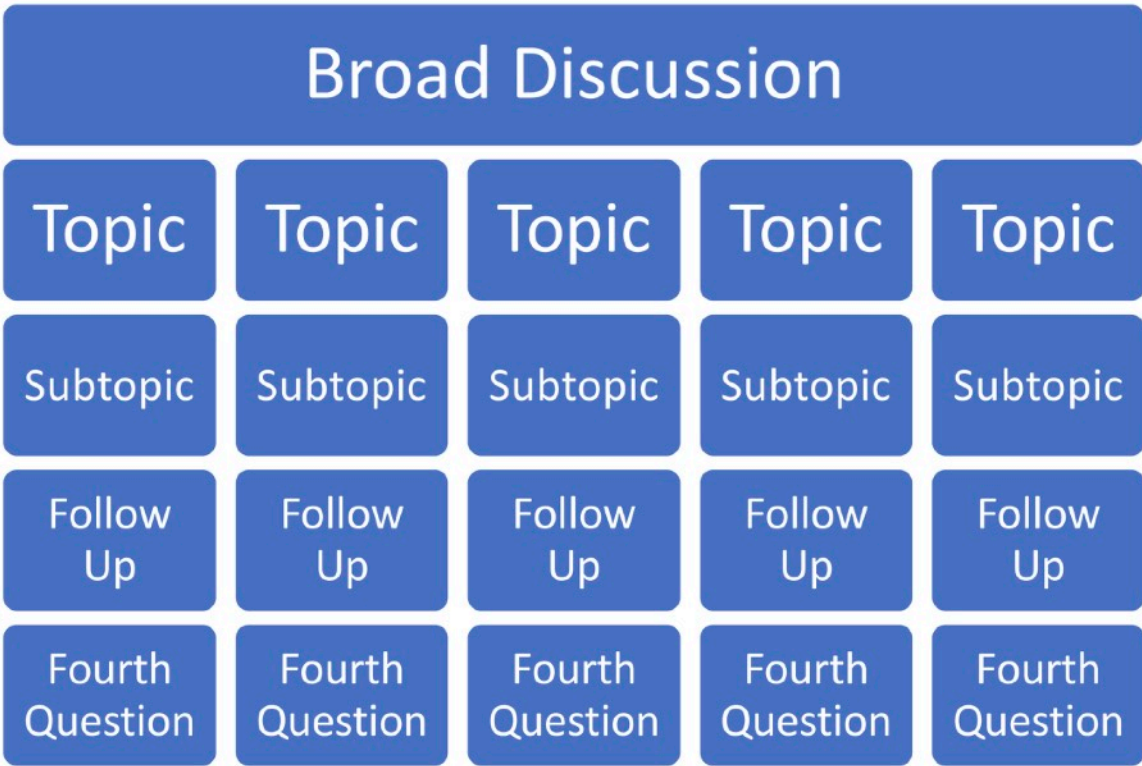
—Chartered Financial Analyst curriculum

GOVERNANCE DOESN'T MEAN YOU CAN'T ASK DETAILED QUESTIONS

► Good governance



► Micro managing



3/30/3000?

10% OR 0.1%

GOOD GOVERNANCE POINTERS

- ▶ Articulate objectives
- ▶ Adopt investment policy
- ▶ Adopt strategic asset mix
- ▶ Allocate decision rights
- ▶ Set policy for monitoring compliance
- ▶ Review, audit, and assess governance

**DECIDE WHO
GETS TO DECIDE**

ALASKA RETIREMENT MANAGEMENT BOARD
RFP Evaluation Committee – ARMB Performance Consultant Audit 19-010

SUBJECT:	Proposal Review – ARMB Performance		ACTION:	x
	Consultant Audit RFP 19-010			
DATE:	June 21, 2019		INFORMATION:	_____

BACKGROUND:

AS 37.10.220(a)(11) provides that the Alaska Retirement Management Board (Board) shall contract for an independent audit of the state’s performance consultant not less than once every four years. Callan Associates Inc. (Callan) has been the general consultant for the Board since its inception in October of 2005. Anodos Advisors performed an audit of Callan and Townsend and presented its report to the Board on December 4, 2014. The report provided recommendations for improving the clarity and understanding of various performance reports, benchmarks and guidelines, but found no substantive issues with Callan’s service and work product.

At its June 2018 meeting, the Board directed staff to prepare a Request for Proposals (RFP) for an ARMB Performance Consultant Audit. The RFP Evaluation Committee consisted of ARMB Trustee Tom Brice, Trustee Lorne Bretz, and Trustee Gayle Harbo.

STATUS:

Staff prepared an RFP notice which was published on the State of Alaska on-line public notice website and on the ARMB website. The notice set forth the requirements for the position, the deadline for submitting a proposal, and a calendar for the performance consultant audit procurement and reporting process.

One proposal was received within the deadline, and this proposal met minimum qualifications for the position. There were additional inquiries, but only one application was submitted. Staff provided each committee member with the RFP, a copy of the proposal and scoring evaluation sheets for the purpose of independently reviewing and scoring this proposal consistently and fairly. Staff provided the cost proposal to the committee after the scores were finalized. Pursuant to the calendar set out in the RFP, the committee met Wednesday, June 12, 2019, for the purpose of reviewing and consolidating the scoring sheets of the individual committee members. After tallying the final score and having a discussion about the quality of the proposal, members of the Evaluation Committee found Anodos Advisors, LLC qualified for this contract.

RECOMMENDATION:

The RFP Evaluation Committee recommends to the Board that staff publish a notice of intent to award the ARMB performance consultant audit contract to Anodos Advisors, LLC and, upon expiration of a 10-day notice period if there are no protests, that a contract be entered into with Anodos Advisors, LLC.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Alaska Target Retirement 2065 Trust

ACTION: X

DATE: June 20-21, 2019

INFORMATION: _____

BACKGROUND

The participant directed plans under the fiduciary responsibility of Alaska Retirement Management Board (ARMB)—Deferred Compensation Plan, Supplemental Annuity Plan and PERS/TRS Defined Contribution Retirement Plans—offer target date funds that are intended to be “one decision” funds for the plan participants. Target date funds gradually become more conservative as the target date approaches and continue through retirement. Through Resolution 2008-02, ARMB established age-based target date funds as the default option for the Defined Contribution Retirement accounts and the Supplemental Benefits System accounts effective July 1, 2009. Subsequently, through Resolution 2008-26, ARMB permitted all participant directed plans to invest in the funds.

STATUS

ARMB has decided to add target date funds in five year increments with the last addition being the Alaska Target Retirement 2060 Trust in 2015.

Staff recommends the board direct staff to add the Alaska Target Retirement 2065 Trust to the current suite of available participant-directed investment options in order to provide an appropriate target date fund for those participants anticipating retirement in or near the year 2065.

RECOMMENDATION

The Alaska Retirement Management Board direct staff to add the Alaska Target Retirement 2065 Trust to the current suite of available participant-directed investment options.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: T.Rowe Price
US Bond Trust Benchmark Change

ACTION: X

DATE: June 20-21, 2019

INFORMATION: _____

BACKGROUND

The participant directed plans under the fiduciary responsibility of Alaska Retirement Management Board (ARMB)—Deferred Compensation Plan, Supplemental Annuity Plan and PERS/TRS Defined Contribution Retirement Plans—offer target date funds and building block funds for the plan participants. The characteristics of the Balanced, Long Term Balanced, and Target Date Trusts are determined by an allocation to underlying building blocks trusts. These building blocks include: US Equity, International Equity (including Emerging Markets), US Bond, and Money Market trusts.

In December 2013, the board decided to change the benchmark of the US Bond Trust to the Bloomberg Barclays Intermediate Aggregate Bond Index (current naming convention) to reduce sensitivity to rising rates and increase sensitivity to inflation.

STATUS

The US Bond Trust currently has an US intermediate aggregate profile complimented by floating rate note securities, shorter term treasury inflation protected securities, and long term treasury securities.

The Bloomberg Barclays US Aggregate Bond Index provides a robust representation of the US investment grade bond market and is more representative of the investable universe available to the investment manager.

Staff recommends the Alaska Retirement Management Board direct staff to change the US Bond Trust benchmark to the Bloomberg Barclays Aggregate Bond Index.

RECOMMENDATION

The Alaska Retirement Management Board direct staff to change the US Bond Trust benchmark to the Bloomberg Barclays US Aggregate Bond Index.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Modify Intermediate U.S. Treasury
 Fixed Income Investment Guidelines

ACTION: **X**

DATE: June 20-21, 2019

INFORMATION: _____

BACKGROUND

Staff manage a fixed income portfolio for the Alaska Management Retirement Board (ARMB) benchmarked against the Bloomberg Barclays Intermediate U.S. Treasury Index. As of May 31, 2019, the market value of this portfolio was approximately \$2.7 billion.

STATUS

At the request of the ARMB, Callan conducted a review of the ARMB's investment guidelines and policies & procedures. Callan reported its findings to the chief investment officer in October 2018. Callan made several recommendations relating to the Intermediate U.S. Treasury Fixed Income Guidelines. These recommendations can be characterized as updates or minor clarifications to existing language. Additionally, staff reviewed the guidelines and recommends additional minor edits. The red-line version of the attached guidelines reflect these edits.

RECOMMENDATION

Approve Resolution 2019-05 modifying the Intermediate U.S. Treasury Fixed Income Investment Guidelines.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Intermediate U.S. Treasury Fixed Income Guidelines

Resolution 2019-05

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee to the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has established an asset allocation for the funds that considers earnings and liabilities on a current as well as a future basis; and

WHEREAS, the Board has authorized investment in fixed income securities; and

WHEREAS, the Board will establish and from time to time as necessary modify guidelines for fixed income securities.

NOW THEREFORE BE IT RESOLVED THAT THE ALASKA RETIREMENT MANAGEMENT BOARD adopts the attached Intermediate U.S. Treasury Fixed Income Guidelines, attached hereto and made a part hereof, regarding investment in domestic fixed income securities.

This resolution repeals and replaces Resolution 2012-21.

DATED at Juneau, Alaska this ____ day of June, 2019.

Chair

ATTEST:

Secretary

INTERMEDIATE U.S. TREASURY FIXED INCOME GUIDELINES

- A. Purpose.** The emphasis of investments in fixed income securities shall be diversification, subject to defined constraints, to minimize risk, to generate income, and to provide liquidity as required.
- B. Investment Management Service to be Performed.** Intermediate U.S. Treasury fixed income Contractors shall invest and reinvest the cash and securities allocated to them and deposited in their account, without distinction between principal and income, in a portfolio consisting of fixed income securities with an intended emphasis on U.S. Treasury securities. These securities will be selected and retained by Contractors solely on the basis of their independent judgment relating to economic conditions, financial conditions, market timing, or market analysis, and will not be subject to direction from the ARMB.
- C. Performance Standards.** Contractors are expected to have returns, net of fees, in excess of the appropriate benchmark over rolling 6-year periods with an ex-ante tracking error, defined as the annualized standard deviation of returns relative to the index, of less than two percent. The benchmark is the Bloomberg Barclays Intermediate U.S. Treasury Index.
- D. Investment Structure.** Permissible U.S. dollar denominated debt investments shall be limited to the following:
1. Money market investments comprising:
 - a. Repurchase agreements collateralized only by U.S. Treasury obligations, including bills, notes, and bonds, and only when the collateral carries a market value equal to or greater than 102% of the amount of the repurchase agreements, and only when the custodial bank appointed by retirement funds will take custody of the collateral;
 - b. Commercial paper rated at least Prime-1 by Moody's Investor Services, Inc. and A-1 by Standard and Poor's Corporation;
 - c. Negotiable certificates of deposit, provided that an issuing bank must have total assets in excess of \$5 billion.
 2. United States Treasury obligations including bills, notes, bonds, other debt obligations issued by the United States Treasury, and backed by the full faith and credit of the U.S. Government.
 3. Other full faith and credit obligations of the U.S. Government.
 4. Securities issued or guaranteed by agencies and instrumentalities of the U.S. Government, but not explicitly backed by the full faith and credit of the U.S. Government.

5. Securities issued or guaranteed by municipalities in the United States.
6. Obligations of foreign governments, sovereign states, supranational entities, and their instrumentalities denominated in U.S. dollars.
7. Investment grade corporate debt securities comprising:
 - a. Corporate debt issued in the U.S. capital markets by U.S. companies;
 - b. Euro-dollar debt (that is, U.S. dollar-denominated securities issued outside the U.S. capital markets by U.S. companies or by foreign issuers);
 - c. Yankee debt (that is, U.S. dollar-denominated obligations and issued in the U.S. capital markets by foreign issuers).
8. Asset-backed Securities (ABS).
9. Agency and non-agency mortgage-backed securities backed by loans secured by residential, multifamily and commercial properties including, but not limited to pass-throughs, collateralized mortgage loans (CMO's), project loans, construction loans and adjustable rate mortgages.
10. Total return swaps referenced to components or sub-components of fixed income indices. To mitigate interest rate risk, the proceeds may not be invested in securities with a maturity beyond 90 days, unless invested in the Department of Revenue internally-managed Short-Term Fixed Income Pool.
11. The Alaska Department of Revenue's internally managed short-term or substantially similar portfolio.

E. Portfolio Constraints. The Contractor of the fixed-income portfolio shall apply appropriate diversification standards subject, however, to the following limitations based on the current market value of assets:

1. The portfolio's effective duration may not exceed a band of +/- 20% around the modified adjusted duration (or effective duration) of the Bloomberg Barclays Intermediate U.S. Treasury Index, unless the investment agreement with an external Contractor specifically allows for a different band.
2. Investments in fixed-income securities shall be placed solely in U.S. dollar denominated debt instruments.
3. The Contractor may not invest more than 30% of the portfolio in securities that are not nominal United States Treasury obligations or the internally managed short-term or substantially similar portfolio at the time of purchase.

4. The Contractor may not invest more than 10% of the portfolio's assets in any one corporate sector as defined by the Bloomberg Barclays indices.
5. Corporate, asset-backed and non-agency mortgage securities must be rated investment grade. The investment grade rating is defined as the median rating of the following three rating agencies: Standard & Poor's Corporation, Moody's and Fitch. Asset-backed and non-agency mortgage securities may be purchased if only rated by one of these agencies if they are rated AAA. Corporate bonds may be purchased if rated by two of these agencies.
6. The Contractor may not purchase more than 10% of the currently outstanding par value of any corporate bond issue.
7. The Contractor may not invest more than 5% of the portfolio's assets in corporate bonds of any one company or affiliated group.
8. There shall be no investment in private placements, except Rule 144A securities.
9. The Contractor shall not sell securities short.
10. The Contractor shall not purchase securities on margin.
11. The Contractor shall not utilize options or futures.
12. Internally Managed Assets: the Contractor may only execute trades with dealers that have a minimum of \$200,000,000 in capital. This requirement does not apply to or restrict trades with direct issuers of commercial paper and mortgage-backed securities otherwise eligible for investment under these guidelines. The dealers must be able to execute orders promptly at the most favorable prices reasonably attainable.
13. Externally Managed Assets: Internal cross trading is permitted but only in accordance with requirements under: (1) 29 U.S.C. §1108(b)(19); (2) 29 C.F.R. §2550.408b-19; and (3) 26 U.S.C. §4975(d)(22).

F. Required Remedies. Recognizing that ratings and relative asset worth may change, the Contractor shall liquidate invested securities with care and prudence when the credit rating of a security falls below the minimum standards set in these guidelines or when the relative market value of that investment type exceeds the levels of holdings permitted in these guidelines. The Contractor is required to notify the chief investment officer to discuss the situation and the proposed liquidation strategy if it is not prudent simply to liquidate immediately

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Adopt Domestic Fixed Income
Investment Guidelines and Authorize
Investment

ACTION: **X**

DATE: June 20-21, 2019

INFORMATION: _____

BACKGROUND

Staff is recommending to the Alaska Retirement Management Board (ARMB) adoption of strategic asset allocations for FY20 that will increase the proportion of fixed income assets for all plans, other than the Alaska National Guard and Naval Militia Plan, from 10% to 24%.

The recommended increase in the fixed income allocation will reduce the liquidity requirement currently borne by the fixed income asset class. As a result, scope of fixed income investment can broaden from its current emphasis on liquid U.S. Treasuries. In recognition of this, staff is recommending changing the benchmark for fixed income from the BB Intermediate U.S. Treasury Index to the BB Aggregate Index.

STATUS

Staff has prepared investment guidelines that would enable investment in a broader allocation of investment grade, U.S.-dollar fixed income securities. There is also a provision for a modest allocation to below-investment-grade securities, capped at 5%.

RECOMMENDATION

Approve Resolution 2019-06 adopting the Domestic Fixed Income Investment Guidelines, and authorize staff to create an account and invest a portfolio subject to these investment guidelines.

State of Alaska
ALASKA RETIREMENT MANAGEMENT BOARD
Relating to Domestic Fixed Income Guidelines

Resolution 2019-06

WHEREAS, the Alaska Retirement Management Board (Board) was established by law to serve as trustee to the assets of the State's retirement systems; and

WHEREAS, under AS 37.10.210-220, the Board is to establish and determine the investment objectives and policy for each of the funds entrusted to it; and

WHEREAS, AS 37.10.071 and AS 37.10.210-220 require the Board to apply the prudent investor rule and exercise the fiduciary duty in the sole financial best interest of the funds entrusted to it and treat beneficiaries thereof with impartiality; and

WHEREAS, the Board contracts an independent consultant to provide experience and expertise in asset allocation and other investment matters to come before the Board; and

WHEREAS, the Board has established an asset allocation for the funds that considers earnings and liabilities on a current as well as a future basis; and

WHEREAS, the Board has authorized investment in fixed income securities; and

WHEREAS, the Board will establish and from time to time as necessary modify guidelines for fixed income securities.

NOW THEREFORE BE IT RESOLVED THAT THE ALASKA RETIREMENT MANAGEMENT BOARD adopts the attached Domestic Fixed Income Guidelines, attached hereto and made a part hereof, regarding investment in domestic fixed income securities.

This resolution repeals and replaces Resolution 2007-24.

DATED at Juneau, Alaska this ____ day of June, 2019.

Chair

ATTEST:

Secretary

DOMESTIC FIXED INCOME GUIDELINES

- A. Purpose.** The emphasis of investments in fixed income securities shall be diversification, subject to defined constraints, to minimize risk, to generate income, and to provide liquidity as required.
- B. Investment Management Service to be Performed.** Domestic fixed income Contractors shall invest and reinvest the cash and securities allocated to them and deposited in their account, without distinction between principal and income, in a portfolio consisting of fixed income securities. These securities will be selected and retained by Contractors solely on the basis of their independent judgment relating to economic conditions, financial conditions, market timing, or market analysis, and will not be subject to direction from the ARMB.
- C. Performance Standards.** Contractors are expected to have returns, net of fees, in excess of the appropriate benchmark over rolling 6-year periods with an ex-ante tracking error, defined as the annualized standard deviation of returns relative to the index, of less than two percent. The benchmark is the Bloomberg Barclays Aggregate Index.
- D. Investment Structure.** Permissible U.S. dollar denominated debt investments shall be limited to the following:
1. Money market investments comprising:
 - a. Repurchase agreements collateralized only by U.S. Treasury obligations, including bills, notes, and bonds, and only when the collateral carries a market value equal to or greater than 102% of the amount of the repurchase agreements, and only when the custodial bank appointed by retirement funds will take custody of the collateral;
 - b. Commercial paper rated at least Prime-1 by Moody's Investor Services, Inc. and A-1 by Standard and Poor's Corporation;
 - c. Negotiable certificates of deposit, provided that an issuing bank must have total assets in excess of \$5 billion.
 2. United States Treasury obligations including bills, notes, bonds, other debt obligations issued by the United States Treasury, and backed by the full faith and credit of the U.S. Government.
 3. Other full faith and credit obligations of the U.S. Government.
 4. Securities issued or guaranteed by agencies and instrumentalities of the U.S. Government, but not explicitly backed by the full faith and credit of the U.S. Government.

5. Securities issued or guaranteed by municipalities in the United States.
6. Obligations of foreign governments, sovereign states, supranational entities, and their instrumentalities denominated in U.S. dollars.
7. Investment grade corporate debt securities comprising:
 - a. Corporate debt issued in the U.S. capital markets by U.S. companies;
 - b. Euro-dollar debt (that is, U.S. dollar-denominated securities issued outside the U.S. capital markets by U.S. companies or by foreign issuers);
 - c. Yankee debt (that is, U.S. dollar-denominated obligations and issued in the U.S. capital markets by foreign issuers).
8. Asset-backed Securities (ABS).
9. Agency and non-agency mortgage-backed securities backed by loans secured by residential, multifamily and commercial properties including, but not limited to pass-throughs, collateralized mortgage loans (CMO's), project loans, construction loans and adjustable rate mortgages.
10. High yield securities, up to 5% of the portfolio's assets at the time of purchase, including the following securities and constraints:
 - a. Convertible bonds;
 - b. Preferred stock;
 - c. Warrants and common stock only if issued in conjunction with or related to bonds purchased by the manager;
 - d. Common stock received from the conversion of a convertible security, the exercise of a warrant or the restructuring of an issuer's debt should be sold within 90 days of receipt or within 90 days of expiration of a restructuring period. If more time is needed, the Chief Investment Officer must affirm in writing that it is in the Fund's best interest to allow more time.
11. Total return swaps referenced to components or sub-components of fixed income indices. To mitigate interest rate risk, the proceeds may not be invested in securities with a maturity beyond 90 days, unless invested in the Department of Revenue internally-managed Short-Term Fixed Income Pool.
12. The Alaska Department of Revenue's internally managed short-term or substantially similar portfolio.

E. Portfolio Constraints. The Contractor of the fixed-income portfolio shall apply appropriate diversification standards subject, however, to the following limitations based on the current market value of assets:

1. The portfolio's effective duration may not exceed a band of +/- 20% around the modified adjusted duration (or effective duration) of the Bloomberg Barclays Aggregate Index, unless the investment agreement with an external Contractor specifically allows for a different band.
2. Investments in fixed-income securities shall be placed solely in U.S. dollar denominated debt instruments.
3. The Contractor may not invest more than 40% of the portfolio's assets in investment grade corporate debt.
4. Corporate, asset-backed and non-agency mortgage securities must be rated investment grade. The investment grade rating is defined as the median rating of the following three rating agencies: Standard & Poor's Corporation, Moody's and Fitch. Asset-backed and non-agency mortgage securities may be purchased if only rated by one of these agencies if they are rated AAA. Corporate bonds may be purchased if rated by two of these agencies.
5. The Contractor may not invest more than 15% of the portfolio's assets in BBB+ to BBB- rated debt by Standard and Poor's Corporation or the equivalents at Moody's or Fitch.
6. The Contractor may not invest more than 25% of the portfolio's assets in any one corporate sector as defined by the Bloomberg Barclays Aggregate Index.
7. The Contractor may not purchase more than 10% of the currently outstanding par value of any corporate bond issue.
8. The Contractor may not invest more than 5% of the portfolio's assets in corporate bonds of any one company or affiliated group.
9. There shall be no investment in private placements, except Rule 144A securities.
10. The Contractor shall not sell securities short.
11. The Contractor shall not purchase securities on margin.
12. The Contractor shall not utilize options or futures.
13. Internally Managed Assets: the Contractor may only execute trades with dealers that have a minimum of \$200,000,000 in capital. This requirement does not apply to or restrict trades with direct issuers of commercial paper and mortgage-backed

securities otherwise eligible for investment under these guidelines. The dealers must be able to execute orders promptly at the most favorable prices reasonably attainable.

14. Externally Managed Assets: Internal cross trading is permitted but only in accordance with requirements under: (1) 29 U.S.C. §1108(b)(19); (2) 29 C.F.R. §2550.408b-19; and (3) 26 U.S.C. §4975(d)(22).

F. Required Remedies. Recognizing that ratings and relative asset worth may change, the Contractor shall liquidate invested securities with care and prudence when the credit rating of a security falls below the minimum standards set in these guidelines or when the relative market value of that investment type exceeds the levels of holdings permitted in these guidelines. The Contractor is required to notify the chief investment officer to discuss the situation and the proposed liquidation strategy if it is not prudent simply to liquidate immediately

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: China Equity Manager Hire

ACTION: X

DATE: June 20-21, 2019

INFORMATION:

BACKGROUND:

At the June 2019 Alaska Retirement Management Board (ARMB) meeting, the ARMB directed staff to engage Callan Associates (Callan) to conduct a search for a China equity manager. Additionally, the ARMB directed staff to evaluate the Callan search results and bring a recommendation to the board at a future meeting.

In October 2018 Callan concluded its search and provided the final search document to staff which included eight investment managers.

Subsequently, staff analyzed and conducted due diligence on each manager. Staff has selected two managers to present to the ARMB at the June 2019 ARMB meeting for final hiring decision.

No manager successfully dominated any one category. The key determinants to the selection of the final two depended mostly on the fees, investment vehicle, and staff's comfort with the portfolio management process and investment team.

STATUS:

Staff is recommending the ARMB select one manager to manage a China equity strategy with an initial investment of up to \$100 million. The selected portfolio must focus primarily on China A shares, but is not constrained to only China A shares.

RECOMMENDATION:

The Alaska Retirement Management Board direct staff to contract with _____ to manage an initial investment of up to \$100 million in a China equity strategy subject to successful contract and fee negotiations.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Risk Parity Search

ACTION: X

DATE: June 20-21, 2019

INFORMATION:

BACKGROUND:

Many institutional investors, including the Alaska Retirement Management Board, have portfolios with concentrated equity market risk. This concentration can lead to volatile returns and significant drawdowns.

STATUS:

Risk parity is a portfolio management approach that seeks to generate higher long-term risk-adjusted returns through more diversified risk exposures than traditional equity-dominated portfolios. The approach generally reduces equity exposure and applies moderate leverage to less volatile, less correlated asset classes to better balance risk diversification. The ARMB heard educational presentations on the approach from Man in October of 2018, Bridgewater in December of 2018, and AQR in April of 2019. Staff believes the approach has merit and recommends having Callan Associates conduct a risk parity manager search.

RECOMMENDATION:

The Alaska Retirement Management Board direct staff to engage Callan Associates to conduct a search for a risk parity manager.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Public Infrastructure & MLP Termination

ACTION: X

DATE: June 20-21, 2019

INFORMATION:

BACKGROUND:

As of March 31, 2019, the Alaska Retirement Management Board has a combined asset allocation of 3.5% to public infrastructure and MLPs (\$920 million invested) via four separate accounts. The role of both public infrastructure and MLPs in ARMB's portfolio is to provide a source of real return diversified from exposure to stocks and bonds while also offering the liquidity of public markets.

ARMB initially invested in public infrastructure via Lazard Asset Management and Brookfield Investment Management in March of 2014. ARMB initially invested in MLPs via FAMCO (now Advisory Research) and Tortoise Capital Advisors in November of 2012.

STATUS:

As of March 31, 2019, ARMB's public infrastructure strategies have collectively had a 62.9% correlation to the S&P 500 since March 2014 while returning 6.5% annualized (net) vs 10.7% for the S&P 500. ARMB's MLP strategies have collectively had a 70.5% correlation to the S&P 500 since March 2013 (the first full quarter with ARMB return data) while returning 3.4% annualized (net) vs 13.9% for the S&P 500.

The high correlation and underperformance, combined with a relatively expensive fee structure, led staff to evaluate the appropriateness of its investment in both public infrastructure and MLPs. Staff has concluded that neither public infrastructure nor MLPs are likely to meet ARMB's diversification needs going forward.

RECOMMENDATION:

The Alaska Retirement Management Board liquidate its investments in public infrastructure and MLPs, terminating the public infrastructure mandates managed by Lazard Asset Management and Brookfield Investment Management as well as the MLP mandates managed by Advisory Research and Tortoise Capital Advisors.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT:	Absolute Return Terminations: PAAMCO Prisma & Zebra Capital Management	ACTION:	X
DATE:	June 20-21, 2019	INFORMATION:	

BACKGROUND:

The Alaska Retirement Management Board has invested in traditional Absolute Return hedge fund strategies since 2004. These strategies have exhibited low risk, but have had modest returns and relatively high total fees.

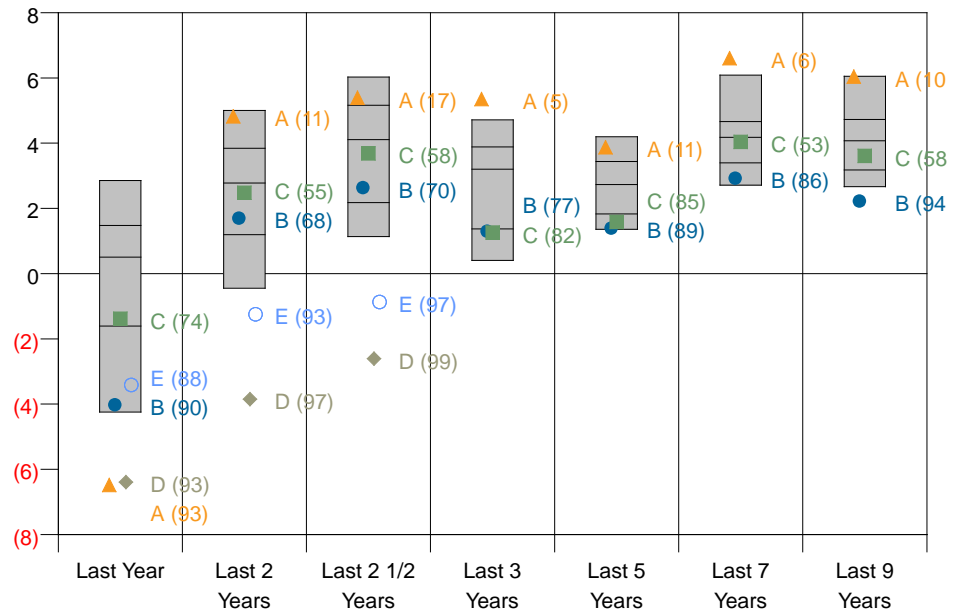
STATUS:

The ARMB has only two remaining traditional absolute return hedge fund managers, PAAMCO Prisma (Prisma) and Zebra Capital Management (Zebra).

Prisma managed \$440 million for the ARMB as of 3/31/19 in both traditional hedge fund-of-funds (FOF) and opportunistic investments. Prisma has lagged the ARMB's absolute return benchmark, with modest overall returns.

Zebra managed \$115 million for the ARMB as of 3/31/19 in a long-short equity portfolio focused on exposure to less popular stocks. Zebra's investment style has been out-of-favor for the past two-and-a-half years and has had negative performance.

Returns for Periods Ended December 31, 2018
Group: Callan Absolute Rtn Hedge Fund of Funds



Median

ARMB Benchmark: 70ACWI/30Agg
HFRI Fund of Funds
Prisma ABS comp (PB -A & B)
Zebra Global Advantage
Zebra Global Equity

▲ A	(6.48)	4.83	5.39	5.36	3.88	6.61	6.04
● B	(4.02)	1.71	2.64	1.31	1.40	2.93	2.23
■ C	(1.38)	2.48	3.69	1.26	1.59	4.04	3.61
◆ D	(6.39)	(3.85)	(2.61)	--	--	--	--
○ E	(3.41)	(1.24)	(0.87)	--	--	--	--

Both Prisma and Zebra mandates have relatively high fees when compared with the average ARMB manager and total returns have not been compelling. As a result, staff recommends termination of both mandates.

RECOMMENDATION:

The Alaska Retirement Management Board direct staff to terminate the absolute return investment mandates managed by PAAMCO Prisma and Zebra Capital Management.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Opportunistic Asset Class Restructuring

ACTION: X

DATE: June 20 - 21, 2019

INFORMATION:

BACKGROUND:

The opportunistic asset class was created in 2017 to locate strategies with performance characteristics similar to a blend of stocks and bonds. The asset class includes defensive equity strategies, niche and broad fixed income strategies, multi-asset tactical allocation approaches, and other strategies that do not fit well in other asset classes.

STATUS:

The role of the opportunistic asset class continues to evolve to include sources of prospective return not readily available in other asset classes.

Additionally, staff is recommending a higher allocation to fixed income in fiscal year 2020, and believes it will have the capacity to accommodate fixed income strategies currently located in the opportunistic asset class.

Staff also recommends terminating several existing mandates to facilitate a broader objective of simplifying the portfolio structure. The following table identifies proposed changes to existing mandates in the opportunistic asset class that reflect these objectives.

Strategy	Destination		
	Opportunistic	Fixed Income	Terminate
Analytic Buy-Write			X
ARMB STOXX 900 USA Min Var			X
Fidelity Signals	X		
PineBridge	X		
McKinley Global Health Care	X		
Project Pearl	X		
Fidelity Real Estate High Income		X	
Fidelity Tactical Bond		X	
MacKay Shields, LLC			X
Mondrian Investment Partners, Inc.			X
Western Asset Management Co			X

RECOMMENDATION:

The Alaska Retirement Management Board adopt the proposed changes as detailed in the preceding table.

ALASKA RETIREMENT MANAGEMENT BOARD

SUBJECT: Domestic Equity Asset Class Restructuring

ACTION: X

DATE: June 20 - 21, 2019

INFORMATION:

BACKGROUND:

Domestic equities form one of the strategic asset classes for the Alaska Retirement Management Board (ARMB). Investments in this asset class have historically included a mix of passive and active strategies, organized by market capitalization into large and small companies. As of May 31, 2019, the market value of domestic equities was approximately \$5.8 billion.

The large cap investment structure is largely comprised of low-tracking error implementations managed against subcomponents of the existing asset class benchmark, the Russell 3000, and to alternative indices that are believed to result in improved risk-adjusted returns relative to the asset class benchmark. Two of these alternative indices are factor-based portfolios designed to gain exposure to portfolio characteristics, such as value, size, momentum and low-volatility. One factor-based portfolio is a low tracking error strategy benchmarked to a Scientific Beta index and one is a pilot portfolio created by staff. Additionally, the large cap component contains the domestic portion of a global mandate that is being restructured and a portable alpha strategy which attempts to benefit from active management in domestic small cap investments.

The small cap investment structure is comprised of active mandates.

STATUS:

Staff considered the merits of implementing portfolios managed against the subcomponents of the S&P 1500, an index similar in coverage to the Russell 3000. The subcomponents of the S&P 1500 are the S&P 900, comprised of large- and mid-cap stocks, and the S&P 600, which is comprised of small cap stocks. The Russell-index equivalents of these subcomponents are the Russell 1000 and Russell 2000, respectively. The table below displays the performance of S&P and Russell domestic equities indices since the inception of the S&P series in January 1994.

1/94 - 12/18	Russell 1000	S&P 900	S&P 600	Russell 2000
Total Return	9.0%	9.2%	10.1%	8.2%
Standard Deviation	14.6%	14.5%	18.1%	18.9%

Staff came to several conclusions:

- The performance profile for the S&P 900 and the Russell 1000 are very similar.
-

- However, the performance profile of the S&P 600 has been superior to that of the Russell 2000.

Staff believes this results principally from the S&P construction methodology requiring constituents generate positive earnings prior to being considered for inclusion in the S&P indices. This requirement introduces a quality bias which may have resulted in lower drawdowns over time.

Staff then evaluated active small cap managers versus the S&P 600. Staff shared the results of this analysis earlier in the meeting. A small percentage of active small cap managers (~ 20%) has outperformed the S&P 600, gross of fee, over time.

Staff also reviewed the collection of existing strategies in large cap. Most of the performance of these strategies can be explained by a combination of the passive investments in either the Russell 3000 or the S&P 1500 and Scientific Beta's four individual factors. For this reason, staff believes prospective performance can be improved and the manager structure simplified by collapsing the existing set of internally-managed and externally-managed strategies into the following internally-managed mandates: S&P 900, S&P 600, Scientific Beta U.S. MBMS 4-Factor EW and the domestic equity pilot portfolio.

The table below compares the performance of the PERS domestic equity portfolio, the proposed structure, the Callan median plan performance and the Russell 3000 over various time periods ending December 2018.

	PERS	Proposed Structure	Public Median	Russell 3000
1/94 - 12/18	8.2%	9.8%	n/a	8.9%
20yrs	5.6%	7.0%	6.4%	6.0%
10yrs	12.7%	13.3%	13.2%	13.2%
5yrs	7.4%	8.1%	7.5%	7.9%

To table below details the changes required to collapse the existing set of strategies.

Strategy	Destination		
	Retain	Add	Terminate
ARMB Equity Yield			X
ARMB Russell 1000 Growth			X
ARMB Russell 1000 Value			X
ARMB Russell 200			X
ARMB S&P 500 Equal Weight			X
Portable Alpha			X
S&P 900		X	
ARMB Scientific Beta	X		
ARMB Large Cap Multi-Factor	X		
ArrowMark Small Cap Growth			X
BMO Global Asset Management			X
Deprince, Race & Zollo Micro Cap			X
Frontier Capital Management			X
Jennison Associates, LLC			X
Lord Abbett Micro Cap			X
T. Rowe Small Cap Growth			X
Victory Capital Management			X
Zebra Capital Management			X
ARMB S&P 600	X		
Futures Large Cap	X		
Futures Small Cap	X		

RECOMMENDATION:

The Alaska Retirement Management Board adopt the proposed changes as detailed in the preceding table, and authorize staff to create an account and internally manage a low tracking error portfolio benchmarked to the S&P 900.